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Research, Extension and Higher Education in Human Nutrition

The Joint Council on Food
and Agricultural Sciences

March 1980

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Joint Council on Food and Agricultural Sciences
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Participants in Study

Ad Hoc Committee on Human Nutrition of the Joint Council of Food and Agriculture:

James M. Iacono (Chairman)	--	Associate Administrator Human Nutrition Center, SEA
Doris H. Calloway	--	Professor of Nutrition University of California, Berkeley
Gale L. Vandenberg	--	Director, Extension Services University of Wisconsin, Madison

Resource Group:

C. Edith Weir (Group Leader)	--	Science Advisor, Agricultural Research, SEA
Elizabeth Y. Davis	--	Group Leader, Human Nutrition Food and Social Sciences Cooperative Research, SEA
Luise Light	--	Director of Dietary Guidance and Nutrition Information Office of the Administrator Human Nutrition Center, SEA
Frances M. Magrabi	--	Program Coordinator, Human Resources, Human Economics and Family Living Joint Planning and Evaluation Staff, SEA
Patricia B. Swan	--	Program Coordinator, Human Nutrition Joint Planning & Evaluation and Human Nutrition Center, SEA (detailed from University of Minnesota, St. Paul)
Jane Voichick	--	Assistant Deputy Director Food and Nutrition Extension, SEA (detailed from University of Wisconsin, Madison)
William C. Weir	--	Nutritionist, Cooperative Research, SEA (detailed from University of California, Davis)

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Other Contributors:

Jane Coulter	--	Coordinator for Manpower Assessment Higher Education, SEA (detailed from Texas Technical University, Lubbock)
Audrey Cross	--	Coordinator, Human Nutrition Policy Office of the Secretary, USDA
Homer C. Folks	--	Assistant Director, Higher Education, SEA (detailed from University of Missouri, Columbia)
Robyn C. Frank	--	Chief, Food & Nutrition Information Center Technical Information Systems, SEA
D. Mark Hegsted	--	Administrator, Human Nutrition Center, SEA
Elizabeth Murphy	--	Chief, Nutrition Branch Food Ingredient Assessment Division Science Program, FSQS
Laura Summer	--	Nutritionist, Office of Policy Planning and Evaluation, FNS
Dennis C. Unglesbee	--	Computer Specialist, Current Research Information System (CRIS), SEA
Esther Winterfeldt	--	Head, Food and Nutrition, Oklahoma State University, Stillwater

Acknowledgements:

Nutrition Committee, Experiment Station Committee on
Organization and Policy (ESCOP)
Nutrition Committee, Extension Committee on Organization
and Policy (ECOP)

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HIGHLIGHTS AND SUMMARY

The USDA supports a broad spectrum of research, extension, and higher education programs in human nutrition. As requested by the Joint Council on Food and Agricultural Sciences, this report includes (1) an inventory of work underway, (2) identification of gaps in the program, and (3) specification of coordination needs. The inventory includes those programs for which responsibility for administration of federally appropriated funds rests in the Science and Education Administration (SEA), the Economics, Statistics, and Cooperatives Service (ESCS), Food and Nutrition Service (FNS), Food Safety and Quality Service (FSQS), and the associated cooperating institutions.

Inventory of Work

Approximately \$28.4 million of USDA funds were expended in FY 1978 on research projects wholly or partially funded by USDA. These were supplemented by other Federal and non-Federal funding, State, industry, and other sources of funds for a total expenditure of about \$35.5 million. The human nutrition research in the land-grant institutions to which USDA does not contribute funds is not included. The analysis is based on 386 projects selected for relevancy to human nutrition and for which FY 1978 expenditure data were available. The research was carried out by the equivalent of 267 scientist years of effort.

Federal funding for Extension in FY 1979 was approximately \$59 million, including \$50 million for the Expanded Food and Nutrition Education Program (adult and youth phases) and about \$9 million as the pro-rated Federal share of funding for general nutrition education programs. The equivalent of 5,372 work years of which 1,654 were professional staff members and 3,718 paraprofessionals were engaged in the work.

There were no direct USDA expenditures on higher education in nutrition in FY 1978. Data obtained from the National Academy of Sciences indicate that approximately 40 students per year were awarded the Ph.D. degree in nutrition and food science over a 5-year period between 1971 and 1975.

Gaps in the Program

The level of effort was limited in most areas identified as high priority in recent reports on human nutrition research. For instance, in FY 1978, few resources were directed to determining the nutritional requirements of pregnant and lactating women, infants and young children--areas where high priority effort had been recommended. By FY 1980, new funds had been appropriated for this area of research. Other areas of work where little effort is currently extended are the effects of nutrition on mental and physical development, and on methodology in every area of nutrition research.

Areas identified by the State Extension personnel as needing additional emphasis are the use of mass media and nutrition programs for low-income families in urban areas, particularly minorities.

There were not enough data specific to nutrition programs in higher education to serve as a base for analysis.

Coordination Needs

It is recommended that the Joint Council take these actions with regard to coordination (pages 107 and 108):

1. Develop a data base for planning coordinated nutrition research, extension, and education programs.
2. Assure adequate attention to human nutrition program needs in long-term planning.
3. Request the Secretary to secure funds to strengthen university capacity for research and training in human nutrition.
4. Request the Secretary to establish policy on dissemination of new nutrition knowledge.
5. Request the Secretary to designate the Human Nutrition Center as a focal point for coordination of USDA nutrition information and education programs.
6. Request the Director of SEA to assess higher education programs in human nutrition.
7. Review the balance between intramural and extramural funding of human nutrition research.

I. INTRODUCTION

The Joint Council on Food and Agricultural Sciences selected human nutrition as an area that should receive special consideration and coordination efforts during 1979. At their meeting on April 11-12, 1979, the Council appointed an Ad Hoc Committee on Food and Nutrition and charged them "to report to the October 1979 meeting on three aspects of the human nutrition program: (a) an inventory of existing work and objectives, (b) an identification of work needed but not underway, and (c) a specification of coordination needs." A preliminary report was submitted to the Joint Council at the October meeting and comments by reviewers were incorporated in the final report.

The report can serve several purposes: (a) it can serve as an information base for planning and evaluating USDA nutrition programs within the Department and the Joint Council; (b) it can be used to identify data that are needed but not available; (c) it can serve as a basis for classifying and inventorying nutrition programs; (d) it can provide a data base for more refined problem identification; (e) it can serve as a basis for making broad conclusions and recommendations; and (f) it can serve as a prototype for reporting on national nutrition programs.

A. Legislative Authority

The 1977 Food and Agriculture Act, Section 1405, designated the U.S. Department of Agriculture (USDA) as the lead agency of the Federal Government for agricultural research, extension, and teaching in the food and agricultural sciences. By definition, this includes food and human nutrition.

Over many years, Congress had delegated to USDA the responsibility for human nutrition research and education programs. The act of June 29, 1935, Section 1, directed the USDA to conduct research on the basic problems of agriculture in its broadest aspects, including research on human nutritional requirements and the composition and nutritive value of food. The act further directed the Department to conduct surveys of food consumption patterns of Americans.

The 1977 National Agricultural Research, Extension, and Teaching Policy Act, Sections 1421-1425, authorizes the USDA to conduct research on various aspects of human nutrition, to carry out a national education program, to disseminate results of food and human nutrition research performed or funded by the Department, and to disseminate educational materials on food and nutrition education. The act also directed the Secretary of Agriculture and the Secretary of Health, Education, and Welfare to develop a nutritional status monitoring system to identify the extent and risk of nutrition-related health problems in the United States. The efficacy of nutrition-related programs in reducing health risks must also be evaluated. These are only a portion of the statutory authorities for USDA food and nutrition activities. See attachment 1 for a more complete listing.

B. Overview of the Report

The report has four sections. Section I contains introductory information and a review of recent reports on human nutrition programs.

Section II contains three inventories. The first, the human nutrition research inventory, is based on projects that were reported in the Current Research Information System (CRIS) on September 6, 1979, as active in FY 1978 and on information provided by FSQS for FY 1978 and by FNS for FY 1979. The Extension inventory is based on a special questionnaire sent in June 1979 to Extension directors in each State. The third inventory is on education. The higher education component is based on extremely limited data, primarily those available from the National Research Council of the National Academy of Sciences. The other component contains a brief description of the USDA's nutrition information and education programs.

Section III describes criteria for identifying program gaps. An evaluation of the adequacy of existing data and some comments as to program adequacy have been made.

Section IV discusses coordination needs that have been identified in recent reports and makes recommendations for meeting some of these needs.

C. Review of the Literature

In the past few years, many reports dealing with some portion of current national nutrition programs have appeared, under the auspices of many different groups. Most of the reports have been critical of certain aspects of these programs and most have called for an increased effort in nutrition research and education. None of the reports has been comprehensive; instead,

each has looked at only part of the total effort and each has looked at that part with a special perspective. Therefore, it is necessary to examine many different reports to begin to get a comprehensive picture of what is being said about current needs. Further, research programs have been examined more extensively than have any extension, nutrition education, or higher education programs. Thus, one does not have a balanced picture even when all the available reports are considered. Nevertheless, a review of recent reports does reveal current thinking of many experts in the field; therefore, it is instructive to undertake such a review. That which follows is an attempt to summarize findings in the major reports of recent years. No attempt has been made in the review of literature section to critique or evaluate those findings.

"The Department of Agriculture and the State Agricultural Experiment Stations were the first scientific organizations in the United States to establish a program of research in food and human nutrition, and to make the results of this work available to the people for better living." Thus begins the 1963 report to the Congress, prepared by the Agricultural Research Service, in which a proposed program for expanded research in food and nutrition is presented (20). According to the proposal, over a 3-year period, funds for nutrition research were to increase from \$1.93 million to \$9.20 million. Connected to these plans were plans for expansion of Department research facilities, including three new regional laboratories in the north-central region, the Southeast, and the Southwest. The report provided a history of the Department's research program in nutrition, food science, and food consumption and projected the content of the expanded program.

Many of the priorities in that report were the same as those being listed today. For example, in considering the nutrition program, the nutritive value of food was discussed, and the needs suggested included increased attention to bioavailability; the study of changes in nutrient content resulting from differences in variety, maturity, processing, and storage; the development of methods for determining newly recognized forms of nutrients; and the provision of nutrient composition data in a rapid and convenient form. Under food consumption studies, the report discussed the use of properly designed surveys for continuous evaluation of special food programs (food stamps, children's program) or educational programs of the Department. The report discussed the need for research on food choices and research on how food habits might be changed. It also suggested a need for developing better food guides.

In examining the major reports written since 1963, it is apparent that objectives have not changed in a striking fashion; however, the ways in which objectives are expressed have changed, and there is somewhat more focus on a few specific problems. Reports appearing in the last 2 to 3 years exhibit much agreement as to priorities, yet they have some important differences in perspective.

The White House Conference in 1969 was a turning point in national nutrition research and education planning because it opened the planning activity to all interested people. The many participants in that conference represented diverse interests. Thus, recommendations from the many conference panels were diverse, and no attempt was made to consolidate recommendations or rank their importance. However, some consensus was apparent, as shown by

similar recommendations from several panels (see table 1, column 12). No attempt was made to look systematically at nutrition research or education programs; nevertheless, several recommendations were made that directly affected these programs. Some of these recommendations from the White House Conference are summarized in tables 1-3.

Four reports for the Senate Select Committee on Nutrition and Human Needs are of particular interest. These reports reflect public activity and professional and nonprofessional thinking about nutrition in the mid-1970's. Two of these reports were prepared by the staff of the Committee--Toward a National Nutrition Policy (14) and Nutrition and Health (15). The other two (16,17) were prepared by the Congressional Research Service for the Committee and represent comprehensive summaries of FY 1975 Federal Government programs in nutrition research and education. The report on research indicated a FY 1974 appropriation for the Agricultural Research Service of \$6.4 million for human nutrition, compared with a total of \$1.93 million in 1963. Scientist years involved totaled 98. Work on food composition within all of the USDA totaled \$1.3 million for FY 1974, in nutrition requirements it was \$4.7 million, and in dietary surveys and nutrition status, research funds totaled \$3.0 million.

TABLE 1.--Human nutrition research priorities identified in recent reports

Category of Priority	USDA Comprehensive Plan 1979 (1)	DHEW Surgeon General Healthy People 1979 (2)	GAO Recommended Allowances 1978 (3)	HERAPP Home Economics Research Priorities 1978 (4)	OTA Research Alternatives 1978 (5)
I. Nutrient Requirements					
A. For different sex, age, climate, activity, etc.	Nutrient requirements for different ages, sex and genetic background (aging, infants and children)			Establish requirements of children, adolescents, and elderly, study requirements for trace elements	
B. For specific nutrients and toxicities and interactions.	Consequences of inadequate or excessive intakes; requirements for iron and newer trace minerals.			Effects of fat & carbohydrate on trace mineral requirements; effects of excess nutrients; effects of drugs.	Determine the requirements for essential nutrients; study interactions; study effects of drugs
C. For different types of development and physiological performance.	Requirements for nutrients necessary for optimal prenatal & post-natal growth and development and work			Effects of nutrient deficiencies on behavior	Study relationships of nutrition to mental development
D. For maintenance of health and prevention of disease	Effects of dietary fats, sugars and fibers on degeneration & disease; studies on obesity	Study possible relationship between diet and cancer		Long-term effects of diet on health & aging; aging & disease susceptibility in sub-clinical nutrient deficiencies	Study role of diet in prevention of chronic disease and obesity; study role of nutrition in treatment of disease and support of therapy
E. More sensitive and accurate methods				Develop sensitive methods for determining nutrient requirements	Develop methods for determining nutrient needs
II. Nutritional practices, food consumption and nutritional status					
A. Survey methods	Improve data collection techniques for food consumption surveys; improve data processing			Develop improved methods for determining food consumption at different ages	
B. Measures of nutritional status	Need better methods for assessing nutritional status			Develop new methods for assessing nutritional health	Need to monitor nutritional status
C. Surveillance and monitoring program	Need better monitoring of nutritional status of the population and of buying practices				Need to integrate food consumption monitoring and nutritional status surveillance
D. Identification of groups vulnerable to poor food habits	Need better methods to identify groups at high nutritional risk				

TABLE 1.--Human nutrition research priorities identified in recent reports (cont'd)

USDA & DHEW Nutrition Survey 1978 (6)	GAO Federal Research 1978 (7)	USDA Food & Nutrition Policy 1978 (8)	NAS World Food & Nutrition 1977 (9)	DSTP New Directions 1977 (10)	USDA U.S. Food Research 1976 (11)	White House Conference 1969 (12)
	Nutrient requirements for infants, children, and adolescents, women, the elderly	Nutrient requirements for infants, children, adolescents and the elderly	Human nutrient needs	Nutrient needs of the elderly	Nutrient requirements of children	Effects of salt in infants.
	Effects of nutrient interactions; requirements for trace elements; effects of drugs			Iron requirements; nutrient interactions	Nutrient interrelationships	
	Nutrient requirements for growth & development; for pregnancy and role of diet in aging	Determine needs of optimal growth, functional performance & sustained well-being; nutrient requirements for pregnancy	Determine effects of low levels of nutrition on work performance, frequency & severity of infection, physical & mental growth & development, school & job performance, pregnancy & lactation & fertility; effect of maternal plane of nutrition on span of reproductive years, pace at which successive pregnancies occur & rate of child survival	Need to assess nutritional status & needs of pregnant women; nutrient requirements for optimal growth & mental & physical performance; effects of iron deficiency on mental & physical performance	Nutrient requirements of pregnant lactating women;	Sodium intake during pregnancy; relation of nutrition to normal & abnormal gestation. Effects of nutrition on growth & development & mental retardation; methods for remedy of injury caused by malnutrition
	Nutrient requirements in disease & stress; long-term health consequences of the modern diet; obesity; cancer; heart disease; dietary fiber	Study factors relating to obesity		Factors contributing to obesity and valid diagnosis of obesity		National diet/heart studies, more research on relationship of diet to atherosclerosis and coronary heart disease; studies of long-term effects of fat-modified diets on growth & development of the young; research on obesity & exercise; behavior modification; evaluation of self-help groups for obesity
		Develop a new approach to studying requirements; long-term effects of iron deficiency			Criteria for determining nutrient requirements	
Better define food intake & dieting practices of individuals and groups	Need more reliable methods to measure food consumption	Develop fast and inexpensive method for collecting food consumption information		Develop fast and inexpensive methods for collecting food consumption information		Develop techniques for monitoring diets; do to USDA surveys on 5-year sequence
Better define relationship between nutrition status and health	Need better measures of nutritional status	Develop precise methods for measuring nutritional status		Develop more precise methods for measurement of nutritional status		Better techniques for determining nutritional status
Monitor dietary intake and nutritional status, including selected high-risk groups; expand & improve surveillance	Need to continuously monitor food consumption and nutrition status			Improve monitoring and surveillance capabilities; expand epidemiological studies		Develop techniques for continuing monitoring systems of nutrition service centers to aid in monitoring and surveillance Give primary attention to preschool children, expectant mothers, primary school children

TABLE 1.--Human nutrition research priorities identified in recent reports (cont'd)

Category of Priority	USDA Comprehensive Plan 1979 (1)	DHEW Surgeon General Healthy People 1979 (2)	GAO Recommended Allowances 1978 (3)	HERAPP Home Economics Research Priorities 1978 (4)	OTA Research Alternatives 1978 (5)
III. Factors affecting food choices			Need for development of food guides more responsive to public concerns	Develop a theoretical approach to understanding formation & change of food habits; study factors related to food choices; acceptability of food related to elements influencing food habits	
A. Effects of psychological & social factors in attitudes & choices	Expand research in sociological & behavioral aspects of nutrition here & in other countries				Study factors affecting lifetime eating habits
B. Effects of economic factors on attitudes and choices	Improve food guides for use by various groups				
C. Motivation for change in food choices	Research in education and motivation techniques			Need methods for effective teaching of nutrition; need educational approaches to changing behavior	
D. Methods for studying food choices					
IV. Food Composition	Study factors influencing nutrient composition of food; improve methods for detecting deterioration & contamination; study nutrient availability			Food handling methods for optimum retention of nutrients in food; effects of processing, storage, etc. on the composition & quality of foods; study nutrient availability in the intestine	
A. Factors causing change in food composition & safety					Study nutritional aspects of food science & food safety; study bioavailability of nutrients; develop better methods for assuring food safety; develop food handling procedures to maintain nutrients
B. Methods for nutrient analysis	Explore new methodologies for determining food composition				
C. Updated data on nutrients in food	Expand facilities for nutrient analysis	More complete nutrient composition data including information on trace minerals and on processed foods			
V. Effects of government nutrition education & information programs	Assess present status, efficiency, & effectiveness of nutrition education programs & alternatives.				
A. Methods for measuring effects of the program		More accurate techniques to measure program effectiveness		Develop methods for evaluating change in various groups	
B. Method for analyzing and evaluating program					Evaluation of nutrition education & communication methods and programs
VI. Effects of government Food Assistance Program & Government Policies on nutrition	Better methods for analyzing & determining cost effectiveness; evaluate effects of school feeding, food stamps, and WIC				

TABLE 1.--Human nutrition research priorities identified in recent reports (cont'd)

USDA & DHEW Nutrition Survey 1978 (6)	GAO Federal Research 1978 (7)	USDA Food & Nutrition Policy 1978 (8)	NAS World Food & Nutrition 1977 (9)	OSTP New Directions 1977 (10)	USDA U.S. Food Research 1976 (11)	White House Conference 1969 (12)
						persons with low incomes; assure participation of low-income groups; assure protection of privacy
Improve usefulness and level of utilization of nutrition information		Determine factors that shape eating habits	Need to know local dietary beliefs and customs; role of women in determining food choices	Identify factors influencing dietary practices		
				Develop guides to eating		
	Need to study effects of newer processing methods	Study factors affecting nutrient content, including newer processing techniques	Effects of local methods of processing and preparing foods on nutritional quality of diets	Factors affecting nutrient availability from foods	Factors affecting nutrient bio-availability; factors affecting nutrient content of processed foods	Need to monitor the nutrient content of our food supply; effects of food processing on food composition
Improve methods of nutrient analysis	Need better methods for determining nutrient composition & availability	Develop new methods for analysis of nutrient composition		Develop improved methods for food composition analysis	Better methods for nutrient analysis	
Expand nutrient data base	Need more current & comprehensive food composition data; include studies of biological availability; include other nutrients such as trace minerals	Update food composition information		Need to update food composition information; expand food composition data	Expanded nutrient analysis data	
					Full & effective evaluation of federal food delivery programs	
Expand research on nutrition education methods			Need to develop and test evaluation methodologies		Need to evaluate food and nutrition education program	
Better define influence of nutrition programs on health; better evaluate programs		Develop new methods to assess effectiveness of federal food & nutrition program; effects of U.S. policies on nutrition of people here & in other countries	Study nutritional consequences of various food distribution & marketing policies & practices; study nutritional effects of food production policies & practices; study nutritional effects of tax & income redistribution policies		Need to evaluate nutrition effects of government food policies	Re-examine agricultural policy for possible conflicts with national food and nutrition goals

TABLE 2.--Nutrition education priorities and needs identified in recent reports

Category of Priority	USDA Comprehensive Plan 1979 (1)	DHEW Surgeon General's Report 1979 (2)	HERAPP Home Economics Research Priorities 1978 (4)	GAO Inform. Public 1978 (13)	White House Conference 1969 (12)
I. Information for General Public	Diversify and improve public information approaches cooperate with GPA to improve distribution to media; evaluate with GPA the cost/effectiveness of GPO, CIC, SCES and Sunday newspapers	Information through the media should be sound; advertising should consider nutritional value; people need information that will motivate them to good food choices and skills to control behavior; need more accurate techniques to estimate program costs and effectiveness		Need to identify the nutrition information needs of audience; systematize the process for developing nutrition materials to avoid duplication, overlap, and inferior products; evaluate effectiveness; increase accessibility to information	Industry should be involved in coordination and design of information programs; need a national center to coordinate nutrition education via the mass media; need to evaluate effectiveness of various forms in cost and in human terms; recommend area nutrition information/education centers
II. Information and Education for Scientists	Information programs for home economists, dietitians, public health workers on food safety; publications for scientists and other professionals; center for information retrieval; evaluate need to support nutrition training programs in universities	Give high priority to nutrition training for physicians and other health professionals	Provide nutrition education for health professionals		Need to expand nutrition manpower; establish centers of excellence for training; need to train health professionals in nutrition; support training of home economics teachers and extension workers; give specific training in maternal and infant nutrition; update physicians on control of coronary disease risk factors
III. Community Education	Targets of community nutrition education programs are families with young children, low income families, the elderly and youth; need to include pregnant women, infants and children	Need better education for patients; better education for mothers and pregnant women	Targets should include pregnant adolescents, infants, children, teenage alcoholics, elderly, all income levels, prisons, physically handicapped and people who can't read; family unit must be considered; need better methods for evaluation of nutrition intervention programs	Should have clear and explicit statement of nutrition education goals and objectives	Should have national nutrition education programs; food retailers should assist; should aim programs at the mother; take full advantage of extension outreach to rural and urban families; programs for elderly and for pregnant women; food assistance should have nutrition education component
IV. Formal Education Programs Related to Schools	Education programs for schools on nutrition and food safety; nutrition education for users of food assistance programs, including pregnant and lactating women	Nutrition education programs should be improved; should teach skills and give information; need to train teachers in nutrition; need to integrate nutrition into the curriculum	Provide nutrition education for professionals and paraprofessionals		Need basic and continuing education for teachers; need education for school food service personnel and for parents; include nutrition education in the curriculum of all elementary and secondary schools; provide education in day-care centers for children, parents, teachers, aides and food service personnel

TABLE 3.--Needs for coordination of human nutrition programs identified in recent reports

Type of Coordination	USDA 1979 (1)	GAO 1978 (3)	USDA/DHEW 1978 (6)	GAO Fed. Res. 1978 (7)	USDA Policy 1978 (8)
I. Between Agencies- within U.S.D.A.	Human Nutrition Policy coordinates research, education, food programs in USDA; Increase coordination of USDA nutrition education programs		Establish a nutrition coordinator for coor- dinating across agency lines; have coordina- tion within each agency; establish department level coor- dinating committee		Establish a coor- dinating unit to develop a USDA food and nutrition educa- tion policy
II. Between USDA and another Department	Informal coordinating group between USDA and DHEW				
A. Research	Subcommittee on Human Nutrition Research under Federal Coordinating Council on Science, Eng., & Technology			Need central focus for research planning and coordinate re- search govt.-wide; de- fine areas of research for (each) agency involved	
B. Education	DHEW & USDA developing nutrition guidelines and joint inventory of education/information materials				
C. Monitoring and Surveillance	DHEW & USDA are integra- ting & coordinating HANES and NFCS				
D. Evaluation	USDA & DHEW evaluate WIC & Child Care Food Pro- gram; USDA & CSA evaluate migrant fami- lies programs				Collaborate with DHEW to evaluate government programs
III. Between USDA and Universities				Assess need for regional research centers working with colleges & universi- ties having nutrition programs	Expand collaboration between USDA & other research institu- tions; coordinate federal-state-local nutrition education, information programs
IV. Between USDA and Scientific Organi- zations		DHEW & USDA to ask NAS to help estab- lish research pri- orities and help in developing & evalu- ating food guides			
V. Other	Increase federal, state, and local cooperation in nutrition education				Cooperate with private, volunteer, and professional organizations to do nutrition education

TABLE 3.--Needs for coordination of human nutrition programs identified in recent reports (cont'd)

NAS 1977 (9)	OSTP 1977 (10)	White House Conference (12)	GAO 1978 Inform. (13)	Pres. Reorg. 1978 (19)
Improved communication and coordination is required within DHEW and within USDA			Intradepartmental task force for developing information materials; USDA & DHEW develop effective nutrition information program with central review boards for materials	Coordination of nutrition research within USDA done by Human Nutrition Center; consolidate all nutrition programs within one agency
Recommend an entity in the President's office to coordinate U.S. and international research	Coordinate extramural research grants program	Establish a coordinating group such as a cabinet level council on federal nutrition commission; and/or establish a focal point within HEW for administering nutrition programs		Interdepartmental Committee on nutrition research chaired by Food & Agriculture; OSTP establish broad interdepartmental priorities
	Recommend interagency nutrition research planning committee under the Federal Coordinating Council on Science, Engineering & Technology	Need to establish a coordination of nutrition education services in the Office of Education	Establish interdepartmental task force for education programs to study cost-effectiveness & role of Federal Government in cooperating with state & local agencies; include representatives of food industry & consumers	
		Need to coordinate USDA food surveys with nutrition and health surveillance		Formal committee of HEW and USDA to plan and coordinate surveillance activities
		Improved coordination within DHEW; plan & implement an effective nutrition surveillance and monitoring system; establish nutrition communications to the public; industry, consumer & community organizations cooperate in nutrition information/education programs; need to coordinate nutrition education activities at the state and local levels		

In 1975, the National Academy of Sciences' Board on Agriculture and Renewable Resources issued a report titled "World Food and Nutrition Study: Enhancement of Food Production for the United States" (18). In that report, six recommendations were made with regard to nutrition research. The singling out of these six categories of nutrition research illustrates the beginning of a consensus on priorities. The categories were as follows:

1. Nutrition surveillance (better methods).
2. Food consumption (better methods and factors determining food choices).
3. Food composition (accurate and timely information, updated and available).
4. Nutrient requirements of man (needs and factors influencing need).
5. Food intervention (evaluation of programs for cost effectiveness).
6. Constraints (analysis of problems for major constraints).

In April 1977, a report by E. L. Corley (USDA) and James Turnbull (SAES) (22) reviewed recent studies, reports, and principal events of special importance to agricultural research. Their review was written in light of the 1972-75 world food shortage and it concentrated on the many reports and studies generated by that experience; 52 reports were cited. The Corley-Turnbull report contains a review of reports and recommendations about nutrition research through 1976. Therefore, the reports reviewed in tables 1 through 3 are concentrated in the years since 1976. As shown in the tables, several major reports have appeared recently having the central theme of better focus and coordination in nutrition research and education programs. The summary of these reports has been divided into five categories--research, education, coordination, funding, and manpower. The reports discuss the question of nutrition research most extensively; funding and manpower concerns are discussed only briefly.

1. Research Priorities and Needs

The reports that considered human nutrition research programs in some detail are summarized in table 1. These reports were written for different purposes and for different readers. The most recent report "Food and Nutrition for the 1980's" (1) was written in March 1979 to meet a Congressional request made as a part of the 1977 Food and Agriculture Act. As such, it represents current thinking within USDA as to goals and priorities in human nutrition research.

The current USDA perspective on human nutrition research is, in large measure, similar to that reflected in the 1978 Department report (8) and the 1977 report of the Interagency Working Group for the Office of Science and Technology Policy (OSTP) (10). On the other hand, the Office of Technology Assessment (OTA) report (5) is somewhat different in its perspective on nutrition research. The OTA report also contains a summary and comparison of the OSTP report and the General Accounting Office (GAO) report (7) and their priorities and recommendations. The OTA report to Congress is cast in the form of alternatives available to Congress for supporting human nutrition research. The HERAPP report (4), on the other hand, represents the perspective of a group of home economics researchers and administrators, people from business and Federal agencies, and users and disseminators of home economics research. (See table 1 for recommendations.)

In spite of the somewhat different perspectives on human nutrition research represented in these reports and in spite of the fact they are written for different audiences, the reports are in considerable agreement as to priorities and needs in human nutrition research. Nine of the 12 reports commented on needs to study factors influencing food composition, eight

mentioned the need for better techniques to assess the nutritional status of various groups, eight suggested that effects of nutrition on both physical and mental development and performance should be studied. Eight reports stressed the need to evaluate information and education programs, whereas five mentioned evaluation of nutrition effects of government food programs and policies. Factors influencing food choices were given priority for study in seven reports, as were better techniques for measuring food intake; seven reports suggested that nutrition requirements for successful outcome of pregnancy should be emphasized. Other areas mentioned in six reports were the study of nutrient requirements of infants and young children, the study of obesity, better techniques and systems for nutrition surveillance and monitoring, better methods for measuring food composition, and better updating and access to food composition data. Other priorities identified less frequently are also summarized in table 1.

Thus, studies related to food composition, nutrient availability, methods for measuring composition, and systems for updating and using the composition data received considerable emphasis. The whole area of monitoring of food intake and nutritional status also received considerable emphasis.

Looking at priorities another way, it is apparent that methodology is considered to be limiting in several areas of nutrition research. Five reports called for better criteria and techniques for establishing requirements, seven reports asked for more accurate and rapid methods for measuring food consumption, eight commented on the need for techniques for measuring nutrition status, and six asked for better techniques for evaluating nutrition

information and education programs and/or food assistance programs and government food policies. This emphasis on methodology suggests the need for some fundamental scientific work, perhaps the need to look to more basic physical, biological, and behavioral sciences for help and the need to provide up-to-date facilities and equipment.

2. Nutrition Education Priorities and Needs

In contrast to the extensive number of reports containing detailed planning as to research needs and priorities, only a few reports assess nutrition education program priorities. Most often, statements about education priorities are made briefly and only in passing. None of the reports takes a comprehensive view of nutrition education; the most detailed assessment is the GAO report (13) in 1978, which looked at the Federal Government's efforts in providing nutrition information to the public. The report stressed the importance of identifying the information needs of the audience but did not discuss techniques for doing this. It suggested a need to make nutrition information more accessible to the public. Further, the report stated that there was a need for a clear and explicit statement of nutrition education goals and objectives, but it did not suggest goals and objectives.

The GAO report (13) primarily discussed the materials that are currently developed at the Federal level by the USDA and the Department of Health, Education, and Welfare (DHEW) as vehicles for informing the public on nutrition topics. The report said that a system was needed for coordinated development of nutrition materials, for informing the public of their availability, and for assessing their effectiveness.

The recent Surgeon General's report (2) discusses nutrition information priorities, and suggests that information provided through the mass media should be sound and should motivate people to make good food choices. The report also suggests that people need to learn the skills for controlling their eating behavior in ways they desire. The report calls for more accurate techniques to estimate the cost and effectiveness of various means of providing information. This is in keeping with research recommendations reviewed in the previous section that stress the need to evaluate nutrition information and education programs and the need for better techniques for doing this evaluation.

Some of the reports address the question of target audiences for nutrition education programs. Health professionals, including physicians, were mentioned frequently as needing education programs; teachers and other school personnel were also mentioned. Three of the reports discussed the need to integrate nutrition into the curriculum in elementary and secondary schools.

The White House Conference (12) suggested the establishment of centers of excellence for nutrition training in colleges and universities. Such centers would provide more and better educated nutritionists. The 1979 USDA report (1) suggests a need to evaluate the situation in colleges and universities to determine if the Department should support nutrition programs through the authority granted to it in the Food and Agriculture Act of 1977. None of the reports discussed the status of nutrition programs in colleges and universities.

Evaluations of extension nutrition programs and of nutrition programs associated with food assistance programs are currently being undertaken by USDA and cooperating groups. However, results of these current evaluations either were not available in time for their inclusion here (extension evaluation) or have not been reported.

3. Coordinating Needs

At the White House Conference in 1969, there was considerable discussion about lack of focus and coordination in Federal and non-Federal nutrition programs. Several panels recommended ways to improve the situation. The recommendations varied, depending on the perspective of the participants, but they had a few common themes. Several recommendations were made for a high level office, commission, or cabinet-level department to coordinate overall Federal efforts and to give national leadership. Other recommendations were concerned with coordination between the health-related programs and the agriculture-related programs, and others addressed the need to have better coordination and focus within a department, such as DHEW or USDA. The overriding concern with health and "hungry people" at the conference led the panels to suggest a focus for Federal nutrition efforts within DHEW.

By the time of the reports by the National Academy of Sciences (NAS) (9) and the OSTP (10), it was apparent that the thinking about coordination had changed somewhat. Coordination remained a major concern, but suggested solutions to the problem were somewhat different. The prevailing view seemed to be that nutrition efforts should exist at several places within

government, but that they should be cooperative and complementary and not duplicate efforts. Thus, coordination was still being called for, but more frequently the suggested mechanism was a committee. The NAS report (9) suggested that someone in the President's Office coordinate U.S. and international research efforts. OSTP (10) suggested an interagency nutrition research planning committee under the Federal Coordinating Council on Science, Engineering, and Technology.

Several reports also discussed the problem of coordination of programs within a department. The NAS (9) report called for more effective arrangements for coordinating nutrition research within DHEW. The OSTP report (10) said improved communication and coordination were required within DHEW and within USDA. The report also suggested coordination of extramural research grant programs. The central theme of the 1978 GAO report (7) was the need for focus and coordination in Federal human nutrition research programs. The report suggested that there was need for a central focus for research planning and a need to coordinate research programs governmentwide. It called for a definition of areas of research in nutrition and the roles to be played by each agency involved. The President's Reorganization Project (19), in looking at food and nutrition efforts, suggested an interdepartmental committee to be chaired by a newly organized Department of Food and Agriculture. They suggested that broad interdepartmental priorities might be established through a mechanism set up in OSTP.

The President's Reorganization Project (19) recommended a formal committee between DHEW and USDA to plan and coordinate surveillance activities. The White House Conference (12) participants suggested a need to coordinate the USDA food surveys with nutrition status and health surveillance in DHEW. They also suggested more coordination within each department in planning and implementing these monitoring and surveillance activities. The 1978 USDA and DHEW joint report (6) described plans for coordination between the two departments. This report recommended the establishment of a nutrition coordinator for working across agency lines within each department and the presence of a coordinator within each agency involved. The report recommended establishment of a department-level committee for coordination.

The USDA policy report of 1978 (8) suggested forming a coordination unit to develop a USDA food and nutrition education policy within the department. The GAO report of 1978 (13) called for an intradepartmental task force for developing information materials within each department; this report also called for a central review board for these materials within each department. Further, it suggested the establishment of an interdepartmental task force for education programs to study cost effectiveness and the role of the Federal Government in cooperating with State and local agencies concerned with nutrition education. Representation on this task force from the food industry and consumers was suggested. The White House Conference (12) panels had called for the establishment of a nutrition communications council to coordinate communications to the public. The panels asked that industry, consumers, and community organizations cooperate in nutrition information and education programs. They suggested a need to coordinate nutrition education activities at State and local levels.

The 1979 (1) report of USDA indicates the types of coordinating mechanisms which have been established in response to the above recommendations. A Human Nutrition Center, officially formed late in 1978, has management responsibility for nutrition research programs, and coordinating responsibility for all human nutrition-related research and education programs within SEA and between SEA and other agencies of the Department.

A Human Nutrition Policy Committee within the Department of Agriculture (1) was created in 1978 to coordinate the Department's responsibilities and activities in human nutrition research, education, food assistance programs, and in food safety and quality assurance. The committee is staffed by the Nutrition Policy Coordinator who works closely with the Assistant Secretary for Food and Consumer Services and the Director of the Science and Education Administration, as well as administrators of the various departmental agencies who serve on the Committee. The Nutrition Policy Coordinator is a member of the Secretary's staff and is actively involved in coordination of nutrition policy considerations with other Departments.

A major coordination effort at the Federal level has been undertaken by the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET) (1) of the Office of Science and Technology Policy. Two committees of that Council have formed a joint subcommittee on human nutrition research. This joint subcommittee is actively involved in promoting coordination among the various units of the Federal government which have human nutrition programs. Certain specific coordinating activities between DHEW and USDA are also described in the 1979 USDA report (1).

The White House Conference (12) participants called for Federal-State-local cooperation in nutrition programs. Most of the recent reports do not discuss this dimension of coordination. The USDA report of 1978 (8) suggests that USDA will cooperate with private, volunteer, and professional organizations in nutrition education and information programs. Further, it calls for an expansion of collaboration between USDA and other research institutions and the coordination of Federal, State, and local nutrition education and information programs. The GAO report of 1978 (13) suggested a possible need for regional research centers, working with colleges and universities having nutrition programs, to coordinate national research efforts and improve collaboration between scientists in government and in universities. The most recent USDA report (1) sets an objective to increase Federal, State, and local cooperation in nutrition education programs.

The details of coordination needs and mechanisms among Federal, State, and local entities have not been examined as well as they have for coordination needs between various parts of the Federal research effort. Likewise, little attention has been paid to specific details of coordination of nutrition education programs within the Federal government or between various levels of government. However, considering that the Joint Council mechanisms for coordination are just now in operation and that several coordination mechanisms have been established recently to involve USDA participation, it seems too early to expect a useful or valid assessment of current mechanisms. After the current mechanisms have been operating for a time, such an assessment might be useful.

4. Funding Levels and Mechanisms

None of the reports reviewed contained a comprehensive discussion of funding of human nutrition research or education programs. However, almost all the reports commented on certain aspects of funding. The OTA report (5) reviewed funding recommendations from GAO (7) and OSTP (10) and suggested the needs for GAO audit to determine Federal spending for human nutrition research in each priority area and to determine the number of scientist years involved. After the audit, it was suggested (5) that Congress would have several options for action on funding. Among these were options to maintain the status quo with some reallocation to areas not receiving support, to appropriate additional funds to specific areas, or to earmark a percentage of Hatch funds for human nutrition research.

The OSTP report (10) discussed the use of extramural competitive grants to fund research and suggested that the grants be increased. The GAO report (7) commented on the traditional instability of federally funded extramural research. The earlier report from NAS (9) had recommended the establishment of a competitive grants program in USDA for research on food and nutrition and had suggested a sizeable increase in funding for that purpose. Funding in that program for FY 1978 and FY 1979 was about \$5 million (compared to the \$4 million target in 1963) and was reduced to \$3 million in FY 1980. The NAS report also suggested a program of 5-year matching grants for non-Federal research facilities and equipment.

In the HERAPP report (4), the FY 1976 funding in nutrition within home economics was assessed to be about \$8.3 million. It was projected that \$26.7 million would be required for this research by 1986. This would be accompanied by an increase of 120 scientist years over the 147 available in 1976 (82 percent increase).

The 1976-1981 Cycle for Projecting and Analyzing Research Program Adjustments (21) states that human nutrition and food quality research within the USDA-States research program has ranked third or fourth in the past three projection cycles, but it consumed only 3 percent of the total dollars available in 1976.

The 1976 report of an ad hoc work group (11) estimated the 1974 scientist years in nutrition, food technology, and food safety to be 662 and recommended an additional 305 scientist years (46 percent increase) in this area over 4 years.

In 1978, the GAO report (7) pointed out that only about 3 percent of the money spent on research in health and agriculture (over \$3 billion) went for human nutrition research.

The most recent report from USDA (1) (attachment 2) indicates a 1979 congressional appropriation of \$40 million for human nutrition research within USDA and \$110 million for nutrition information and education. The nutrition research programs within the Science and Education Administration (SEA) total \$33 million, whereas SEA nutrition education and information programs total \$63 million. There has been a steady increase in funding for human nutrition research and education in the last few years. However, increases of the

magnitude envisioned at the White House Conference or in the more recent reports reviewed here have not been forthcoming. The OTA report (5) questions whether the manpower would be available to implement and sustain a substantial increase in a comprehensive nutrition research program.

A major problem found in all the reports was that of distinguishing nutrition research from other closely related research. This problem is at the root of current inability to compare sets of figures from one report to another. Thus, it is difficult to assess precisely how much funding for nutrition programs has increased and exactly what percentage it represents of our total research and education effort. A precise definition of nutrition research, for the purpose of program assessment, would be helpful in developing better evaluation data.

5. Manpower Needs

None of the reports reviewed discussed comprehensively the question of manpower needs in the field of nutrition. However, there were several comments about manpower, particularly in the more recent reports. For example, the OTA report (5), in summarizing and comparing the recent GAO report (7) and the recent OSTP report (10), states "...no reliable figures are available for numbers of nutrition research scientists already in the laboratory or now in training." The report suggests that before a comprehensive research program is established, it will be necessary to consider the ability of the field to implement and sustain such a program. The report recommends a census of nutrition scientists in government facilities, universities, medical facilities, private institutes, and industry and, following that, a consideration of Federal support to fill in gaps that become apparent during the census.

The Senate Select Committee on Nutrition and Human Needs suggested in a 1976 report (17) that Federal support for the training of nutrition research specialists should be stepped up. The GAO report (7) discussed the shortage of nutrition scientists by saying, "Many members of the scientific community believe that there is a shortage of scientists capable of operating effectively in nutrition. Thus, insufficient manpower could be a barrier to substantial progress in human nutrition research." The report notes that forecasting manpower needs is particularly difficult, since little accurate information exists on the number of nutritionists employed and the nature of their employment. According to the OTA report (5), there was some doubt, on the part of individuals in the OSTP, about the nutrition scientist manpower shortage. Apparently, some feel that qualified people already exist who will turn their attention to nutrition research when increased funding becomes available.

The recent USDA report (1) suggests that one objective of the Department is to evaluate the need to provide categorical assistance for training of nutrition specialists at institutions of higher education, in the light of the authority given to USDA to strengthen education programs.

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D. Work in Progress

Several projects are still in progress that will contribute to the Joint Council's assessment of needs and priorities in human nutrition.

The Department of Agriculture is conducting a manpower survey that will be completed within this fiscal year. The Department of Health, Education, and Welfare is now responding to a congressional mandate for a health manpower survey. Both surveys will provide information on manpower supply and needs in nutrition.

The Department of Agriculture has cooperated with the National Center for Educational Statistics to devise a system to improve the taxonomy for collection of their data on home economics and agriculture. The improved taxonomy will help in collecting data on students in colleges and universities who are pursuing or have been granted degrees in nutrition. It will probably be 1-1/2 to 2 years before data become available using the improved taxonomy, but at that time nutrition manpower supply assessments should be considerably improved.

An evaluation of the extension program has been recently completed and will be helpful in assessing needs in nutrition education and information programs. The evaluations of the Expanded Food and Nutrition Education Program (EFNEP) for low-income families with children will be useful in assessing adequacy of programs in that area.

Thus, additional data are expected that will help Joint Council efforts in 1980 and the years ahead.

II. INVENTORIES OF RESEARCH, EXTENSION AND HIGHER EDUCATION

The three inventories discussed in this section are limited in several important ways. The data on research programs in the Science and Education Administration (SEA) represent only those for which FY 1978 data on expenditures and manpower are available in the Current Research Information System (CRIS). The competitive grant awards made in FY 1978 are not included in the inventory although funds were obligated in FY 1978, because expenditures did not begin in that fiscal year. For this reason, the competitive grant research funded in FY 1978 and 1979 has been tabulated separately. Requirements for reporting projects in CRIS vary. Research funded by SEA and the Economics, Statistics, and Cooperatives Service (ESCS) is reported in CRIS. Some but not all of the research supported by State appropriations is reported and the policy varies among and within States. State supported projects that do not involve USDA funds are not included in the inventory. Other limitations are noted in the discussions of specific programs.

Evaluation and other studies related to nutrition intervention programs conducted by the Food and Nutrition Service (FNS) are not included in CRIS and have been classified with the aid of FNS staff. Research funded by the Food Safety and Quality Service (FSQS) in support of nutrition labeling and regulatory programs also is included.

The inventory of Extension programs contains the most up-to-date information in the report. It is based on a special questionnaire that went to State Extension directors in the summer of 1979. The inventory contains estimated data on funding of Extension nutrition programs because these data are difficult to obtain separately from other Extension programs.

The major program in nutrition education within the public schools funded through USDA-FNS is discussed only briefly in this report. The USDA nutrition information programs also are described briefly. The Technical Information Systems (TIS) through the National Agricultural Library (NAL), USDA, has a major program of information services through its Food and Nutrition Information Center. The Human Nutrition Center also conducts a dietary guidance and nutrition information program. Both programs are described in the education inventory. Some information is reported from FNS which relates to nutrition education components of food assistance programs, including food stamp and child nutrition programs and the Women, Infants and Children (WIC) program.

A. Research

1. Procedure Used to Obtain Data

The inventory was designed to encompass nutrition programs in USDA that provide research based data on nutrition needs, dietary guidance, and the delivery of nutrition and dietary information to the public. Agencies whose research programs are included in the inventory are the Science and Education Administration (SEA) units--the Human Nutrition Center (HNC), Agricultural Research (AR), and Cooperative Research (CR); the Economics, Statistics, and Cooperatives Service (ESCS); Food and Nutrition Service (FNS); and Food Safety and Quality Service (FSQS). Only two aspects of the food and nutrition action programs of the department, such as food stamps, children's, and WIC programs, were included. These were the research associated with evaluating the effect upon the nutritional health of the persons served and the design, testing, and evaluation of diet and food use guidance materials prepared specifically for the action programs.

The research inventory was based on the scientist year (SY) and expenditure data in the Current Research Information System (CRIS) on September 6, 1979. The search includes all projects in SEA and ESCS funded by USDA in whole or in part and having expenditures in FY 1978. These are the data that could be obtained within the time frame of this report. They reflect only a part of the research underway in the land-grant institutions because they do not include research supported totally by funds from other Federal departments, State appropriations, industry, and other sources. Information on FNS and FSQS was supplied by personnel from those agencies.

The research program has been classed into 12 major categories according to research objectives selected to represent current major program interests. These categories and the nature of the work contained in each are described under Program Objectives. The projects were further classified to identify high-risk groups, socioeconomic factors, health factors, and research models.

The supporting agency and performing agency are synonymous for most projects funded by SEA. Those funded by ESCS and FNS are done extramurally under contract. Some FSQS research is intramural and some is extramural. In this inventory, essentially all human nutrition related projects supported jointly by USDA and non-Federal funds are performed in cooperating institutions and are reported under SEA Cooperative Research (CR). Fifty-six percent of the non-USDA federally supported nutrition-related research reported in the inventory also is performed in the cooperating institutions. The "other Federal funds" reported in this inventory are those that contribute to projects supported in part by USDA. Among the other Federal agencies contributing funds are DHEW and the National Science Foundation.

In addition to the 386 projects for which USDA expenditures were made in FY 1978, the CRIS contained program data for 103 projects underway at land-grant universities but not involving USDA funds. These projects are not included in the research inventory. They account for an additional estimated 43 scientist years and \$1.7 million. However, these figures do not reflect the total research on human nutrition at cooperating institutions because of differing policies on reporting non-USDA funded work to CRIS. SEA Cooperative Research estimates that 20 percent of the total program in cooperating institutions is not reported.

A comparison of funding levels per SY in Federal laboratories with those in college and university laboratories may be misleading if two factors are not considered. First, when Federal laboratories use an outside contractor to accomplish research, no outside SY's are recorded. Thus, the apparent funding available for each Federal SY will be higher than the amount actually spent to back up the program of each Federal scientist. Second, when colleges and universities assign dollars to a project, these dollars do not cover all of the overhead costs of running the laboratories involved. Thus, the dollars apparently available per SY in college and university laboratories are somewhat lower than the dollars actually spent.

For the purpose of this inventory, research on food production, processing, marketing, and transport was included only when the purpose of the project was the enhancement and maintenance of the nutrient content or nutritional quality of the food. The important contribution to knowledge of human

nutrition from much of the research on the nutrition of ruminant and non-ruminant animals was recognized. However, this work and associated biochemical studies were included in the inventory only if the contributions to human nutrition problems were clearly defined.

2. Program Objectives

The categories used to classify the research were based on consideration of needs for sound scientific knowledge from which to make dietary recommendations and guide action programs. Subject matter areas essential for advances in nutrition knowledge, such as the bioavailability of nutrients from food and new research models, were identified. Several reports by task groups charged with evaluating Federal efforts in human nutrition research also were considered. These reports included: the USDA Comprehensive Plan, 1979; Home Economics Research Assessment, Planning and Projections, 1978; Nutrition Research Alternatives, OTA, 1978; Federal Human Nutrition Research Needs, a Coordinated Approach to Advance Nutrition Knowledge, GAO, 1978; United States Department of Agriculture's Commitment to Food and Nutrition Policy, 1978; and New Directions in Federally Supported Human Nutrition Research, OSTP, 1977.

The 12 major categories used in the inventory were developed to show work underway on nutrition problems for which answers are urgently needed in order to successfully implement USDA goals for improved nutrition, to make possible comparisons with priority areas suggested in prior reports (see above) and to show the relation to areas of research identified in the Food and Agriculture Act of 1977 as having special importance to USDA. The

categories were further divided into 48 subcategories to indicate areas of research that require special attention. The 12 major categories were designed to cover the preparation of dietary guidance material and its dissemination, nutrition education research, and evaluation of intervention programs as well as research on requirements for nutrients and environmental factors affecting nutrient and food needs throughout life. A more detailed description follows.

Categories used in classifying nutrition research programs

1. Nutrient Requirements

This research encompasses elements and compounds identified as essential to man and that man does not synthesize in amounts adequate to maintain body functions and health.

- a. The focus of these studies was on the determination of minimum, optimum, and/or maximum, and upper limit intakes for each nutrient and combinations of nutrients. Included were studies using human subjects and/or animal models designed to determine ranges in level of intake of nutrients needed by humans at different ages, physical activity, and during pregnancy and lactation. (This definition for research on nutrient requirements is more limited than the one often used. In a broader definition, the greater part of the categories under nutrient metabolism and function, diet/health relationships, and nutrition and development could be considered research on nutrient requirements.)

- b. The methodology studies in this category are mainly concerned with new methods and approaches to determining requirements. (Studies of the metabolic pathways and function of the nutrients, frequently considered as methodology for the study of nutrient requirements because they suggest new dimensions to be evaluated in establishing requirements, are considered in another category.)

2. Nutrient Metabolism and Function

This category includes research to elucidate the metabolic role or function of nutrients in man, their essentiality, digestion, and absorption.

- a. Included here are studies on the role or action of nutrients, their precursors, and metabolic pathways. Among these are in vitro and in vivo studies using human subjects and systems known to model humans including animal and single cell models, tissue and subcellular systems. These studies have to do with the effect of diet upon the metabolic fate, physiological and biochemical functions of nutrients in man. These studies establish the essentiality of nutrients and help identify criteria for determining requirements. In this respect, this category overlaps and supports the preceding category on nutrient requirements. (The large amount of research focused on metabolism of other species to determine their nutrient and feed needs is excluded. However, it is recognized that some parts of that research contribute basic information of value in the study of human nutrition.)

- b. In this category was placed nutrient interaction research dealing with the relationship among nutrients in metabolism and resulting effects upon nutrient requirements of humans. The studies focus on which nutrients interact and the nature, extent, and reversibility of the metabolic changes that occur.
- c. These studies related to the bioavailability of nutrients as they naturally occur in foods including digestion and absorption. The research includes identification of the chemical forms and linkages in which nutrients occur in foods, determination of their nutritional usefulness, problems encountered in the release of nutrients from foods and food mixtures during the digestive process, and factors that augment or interfere with the absorption process.
- d. The methodology research in this category relates to new or improved approaches to studying metabolism, the determination of the chemical structure of intermediary metabolites, enzymes, and hormones known to take important roles in nutrient metabolism and in the development of instrumentation and analytical techniques which will permit study of in vivo changes with the minimum risk to the subject.

3. Diet/Health Relationships

These studies are primarily to determine the effects of total diets, individual foods, and food constituents upon the health of man. Short- and long-term health effects are studied.

- a. This research category is on the role of foods and diet in the long-term health of humans. It includes long- and short-term studies, as well as lifespan and successive generation studies using animal models. Studies in this category elucidate the role diet plays in relation to other environmental factors such as alcohol, antibiotics, contraceptives, diuretics, pharmacological levels of vitamins, atmospheric stress, and exercise as well as the effect of dietary sources of energy--kinds and levels of carbohydrate and fat--on such health parameters as hypertension, blood cholesterol, and glucose levels.
- b. This category involves evaluation of the role of food constituents, including individual nutrients, in health and disease and is based on both long- and short-term studies in human subjects and/or in appropriate animal models of the response to naturally occurring food constituents, including caffeine, lactose, and phosphates, on selected health parameters.
- c. These studies address the dietary causes, prevention, and management of obesity and diet-related disease.

4. Nutrition and Human Development and Performance

These are studies on the relationship of diet to physical and physiological development, performance, and changes throughout life.

- a. Included are investigations of the role of total diet and/or food constituents on physical and mental development and on performance in critical periods of growth and maturation--conception to senescence. These studies deal with the relation of diet to the growth and function of the brain, the neurologic, muscular, and skeletal systems, learning ability and work performance.
- b. Included here are studies of the role of diet in the aging process. Research includes studies of foods and dietary levels of nutrients--marginal to excessive--as they influence the biochemical and histological changes associated with aging.
- c. This category includes work whose purpose it is to develop methodology and model systems for studying the relationship of diet to physical and mental performance.

5. Nutrition Monitoring and Surveillance

This research encompasses the several approaches--economic, epidemiological, biochemical, and clinical--that are used to estimate nutritional adequacy of the food supply, diets, and intake.

- a. This category includes work on the nutritional status of individuals or groups. Included also are studies of dietary intake accompanied by some anthropometric, biochemical, or clinical measurement of nutritional status.
- b. These studies include estimates of the nutrient content of the food supply calculated from data on the disappearance of food commodities from the market. These estimates of food use are based primarily on food commodities as they enter the marketing system and do not reflect the amount of food actually eaten. Calculations based on these data estimate the availability of nutrients in the food supply.
- c. These include studies of food consumption and practices of individuals and populations. This category includes the USDA's periodic Nationwide Household and Individual Food Consumption Survey. The data provide a basis for appraising diets of individuals and groups.
- d. This category includes improvement of methodology for assessing nutritional status such as development of new, sensitive, and rapid methods for measuring nutritional state and improved ways to select individuals to be included in monitoring and surveillance programs.
- e. These studies on methodology for assessing nutrient intake include development of improved procedures for obtaining reliable data on dietary intake.

6. Nutrition and Behavior

This research encompasses both the effect of diet and food constituents on emotional behavior and the effects of environment, sociocultural, and psychological factors on diet quality. This category of research complements category 4, nutrition and human development and performance, which deals with the effect of diet upon biological, physical, and mental performance including learning ability.

- a. Research in this category deals with the effects of total diet and/or food constituents on social and emotional behavior, such as hyperactivity, and on psychological health. Included are the effects upon behavior of starvation, nutrient deficiencies, depressants, and stimulants which are natural food constituents or common additives.
- b. Work here includes studies of the influences of biological and psychological factors on food-related behavior. Among the variables studied are the effects of factors such as hormonal levels, age, time of day, season, exercise, temperature of environment and food as well as the taste, odor, color, and texture of the foods that influence sensory perception and acceptance.

- c. This category includes work on the influences of economic, social, cultural, and other environmental factors, including advertising, on food-related behavior; those factors that influence food choice. (This subcategory tends to overlap the previous one "food consumption and practices of individuals and populations" under nutrition monitoring and surveillance. In the food consumption and practices subcategory, the individuals and groups studied are described in terms of their economic, social, and cultural background. In contrast, this subcategory under nutrition and behavior refers to studies designed to determine the influence of the environmental factors.)
- d. Included here are behavioral strategies to improve nutrition or diet status. These are applied studies to see what effect changes made in the environment such as meal spacing, frequency of eating, or size of meals may have on improving the nutritional quality of diets.
- e. This category contains research on the development of food behavior and patterning of food habits over the lifespan.
- f. This category includes work on methodology and model systems for research on the relationships between nutrition and behavior.

7. Studies Related to Intervention Programs

This category includes research on the impact of programs having as a goal improving the diets of high risk groups by economic, educational, or other means.

- a. These are studies on changes in nutritional and health status of individuals directly related to intervention programs conducted at the national, State, and local levels. Included are studies of food intake and dietary adequacy and impact of the program upon health status.
- b. Comprehensive evaluations of programs, including development of a descriptive data base of ongoing programs and assessment of their nutritional impact on target populations, are included here. This category mainly involves evaluation of action programs by FNS.
- c. Studies of the economic and social consequences of nutrition intervention programs are contained in this category.
- d. This category is made up of evaluation and systems analysis of management and operations of intervention programs including accessibility of the program to target groups and the degree of participation in the program by qualified individuals.
- e. Methodology and model systems in this category include work on how to measure the success of the programs and evaluate new programs and predict their acceptance.

8. Nutrition and Dietary Guidance

This category covers the development of information materials for use in nutrition education programs and in support of nutrition intervention programs whose primary objective is to improve the nutritional quality of diets.

- a. These studies include design, development, and evaluation of food guidance systems--plans for the purpose of improving dietary quality such as the use of food guides, dietary standards, and guidelines.
- b. Included here is the development and dissemination of consumer information such as food buying guides and nutrition label and food safety information.
- c. Research analysis, appraisal, and interpretation of research for developing food and diet guidance are included in this category.

9. Nutrition Information Development and Delivery

This category of work combines research on developing and evaluating the strategies and systems used to deliver nutrition information with evaluation of those programs. A large part of research conducted by the Food and Nutrition Service falls in this category.

- a. Included here are design, testing, and evaluation of mixed and single media delivery strategies for conveying nutrition and food related information to consumers in nutrition intervention programs. (This category carries through to the evaluation of information delivery strategies, and in this respect it differs from the following category.)

- b. Studies on print and other media development for use in nutrition information and education programs are included here. Among these are studies on development of nutrition information materials, self-instruction guides for nutritional training of professionals and paraprofessionals, discussion guides, and audiovisual materials for use by opinion leaders, educators, and communicators.
- c. These are studies on the development and use of advertising, marketing, and public relations techniques to inform the public about food, diet, and nutrition matters significant for public health.
- d. This includes the assessment of public needs and wants related to food and diet guidance. Included is the assessment of consumer demand for nutrition related information on food labels.

10. Nutrition Education and Training

This category includes the development of new concepts for teaching nutrition as well as development of curricula for nutrition education and training in schools and universities--curricula are designed for use in K-12 as well as at undergraduate, graduate, and post doctoral levels. Also included are curricula for retraining and updating of professionals, and nutrition training for persons in related fields who provide much of the nutrition instruction for K-12.

11. Food Composition

Studies having the major focus on the nutrient content of food and food products are included.

- a. In this group are the analyses of foods for nutrients including fiber. Studies where one or more nutrients were assayed as a quality measure of a production or processing variable were not included. Excluded also were analyses of experimentally produced or processed foods and food products which were not representative of foods on the market.
- b. This category includes the analyses of foods for non-nutrient constituents. It includes analyses for naturally occurring food constituents that enhance or decrease the value of nutrients such as phytates, some enzymes, and organic acids. (Research that included assay of nutrients was included in (a) above.)
- c. Included is the compilation of food composition tables--including nutrient content--National Nutrient Data Bank; Composition of Foods, USDA Handbook No. 8, and others.
- d. This category includes studies to improve nutrient analysis methodology--chemical and physical methods, automated instrumental analysis, improved extraction procedures, and the modification and application of analytical techniques for nutrients to foods and food mixtures.

- e. In the category on nutrient analysis methodology are the studies of biological methods including microbiological and animal assays. (There is some overlap between this category and "bioavailability of nutrients" under metabolism and function. The bioavailability category deals with the understanding and character of differences in availability and identification of the factors responsible. The methodology category deals with methods for analysis of the available forms of nutrient in food so that the value reported represents its actual nutritional value.)

12. Food Delivery Systems With a Focus on Diets, Nutrition and Health

This category includes research on improving the nutritional quality of foods through changes in production, processing, marketing, and food service systems. Also included is the development of food products to meet special and unusual nutrition needs.

- a. The category includes research on changes in agricultural practices designed to improve the nutritional quality of the diets of individuals. Only those studies are included in which the enhancement of nutrient value of the food is the primary focus of the research. Among projects excluded are those whose primary focus is on plant breeding and animal production methodology even though the long-term goal would be nutritionally improved diets.

- b. Processing, marketing, and transportation systems developed for the purpose of conserving or enhancing the nutritional quality of foods are included. Only those studies focused on nutritional quality are inventoried. Projects utilizing nutrient content as an indicator of product quality are not included.
- c. Food delivery systems which support or improve diet quality are in this category which covers techniques for enrichment and fortification with nutrients; development of special formula foods for specific dietary problems; products for use as dietary supplements; and products to meet a wide variety of special dietary needs.
- d. This work has to do with the evaluation of food delivery systems with respect to nutritional quality of diets. Emphasis is on the nutrient value of the food as it is eaten. Included is the effect on the nutrient content and value of the food of preparation, handling, and storage of food in households, food service institutions, fast food service systems, food vending systems, prepared and partially prepared foods. Studies of preparation, holding, and plate waste are included. Only those studies of the food delivery systems focused on the nutritional quality of food are classified in this subcategory.

3. Other Factors Used in Classifying Research

To more fully identify the population groups and individuals being studied and the research models used, the research projects were classified according to several biological, economic, and health factors. Where appropriate, projects were classed for these factors: age, sex, pregnancy and lactation, ethnic group, income level, urbanization, place of birth, nutrients studied, health factor, and research model system. From these data, it is possible to identify some of the high risk groups that current research is neglecting.

The quality of the data and its closeness to representing the real situation reflect the project information in CRIS. Guidelines are provided for coding the projects for CRIS, but scientists differ in interpretation of the instructions and thoroughness in coding the projects.

4. Inventory Data and Analysis

Interpretation of the research inventory findings must be qualified by the consideration that the research is limited to that funded partially or entirely by USDA appropriations. The data should not be considered indicative of all current research on human nutrition in the United States (table 4). Of the approximately \$35.5 million reported in this inventory as spent on nutrition research in FY 1978, about 80 percent came from USDA appropriations, 7 percent from other Federal funds, and 13 percent from non-Federal funds.

TABLE 4.--Scientist years and funds expended for USDA supported research in FY 1978 by program category¹

Program category	Scientist years	Source of funds (\$000)			Total funds
		USDA	Other Federal	Non-Federal	
Nutrient Requirements	6.1	1,455	0	121	1,576
Nutrient Metabolism and Function	73.5	5,426	781	1,546	7,753
Diet/Health Relationships	29.6	1,824	217	802	2,844
Nutrition and Development	3.1	208	170	132	510
Nutrition Monitoring and Surveillance	33.4	5,050	245	501	5,796
Nutrition and Behavior	18.2	713	23	468	1,204
Studies Related to Nutrition					
Intervention Programs	21.1	5,890	170	104	6,164
Nutrition and Dietary Guidance	8.3	626	308	2	936
Nutrition Information Development and Delivery	5.0	3,228	0	34	3,262
Nutrition Education and Training	0.7	73	0	12	85
Food Composition	36.1	2,437	325	153	2,915
Food Delivery Systems With a Focus on Diets, Nutrition, and Health	31.0	1,532	190	714	2,436
TOTAL	266.5	28,462	2,429	4,590	35,481

¹FNS funds included were for FY 1979.

Nutrition research by agency--Research on human nutrition is funded by four units within USDA (table 5). They are the Science and Education Administration (SEA), Economics, Statistics, and Cooperatives Service (ESCS), Food and Nutrition Service (FNS), and Food Safety and Quality Service (FSQS). Most of the funds are in SEA, about \$20.8 million, 59 percent. The remainder of the USDA funding is: FNS about \$7.2 million, 20 percent; ESCS \$0.3 million, 1 percent; and FSQS about \$104,000, less than 1 percent. In addition to these funds, about \$2.4 million, 7 percent, comes from other Federal agencies and about \$4.6 million from State and other non-Federal sources. These figures reflect the funding of the research projects in this inventory which includes only those that received some USDA funds in FY 1978.

The SEA program includes the FY 1978 funding reported in CRIS for the programs of the Human Nutrition Center (HNC), about \$13.2 million; Cooperative Research (CR) administered programs funded by Hatch funds, \$3.2 million, and \$2.3 million under PL 89-106 to the 1890 Colleges and Tuskegee Institute; and that part of Agriculture Research (AR), \$2.1 million, having improvement of nutritional value of food as a primary objective. The makeup of SEA programs is discussed further under the section on research by program objective.

In FY 1978, ESCS funds were \$322,000 for research that met the definition of nutrition research used in this inventory. It had to do with the effect upon food consumption of participation in the Food Stamp Program; with monitoring the effects of the Expanded Food and Nutrition Education Program (EFNEP); and the assessment of the type of information needed by consumers to make sound decisions for food buying.

TABLE 5.--Expenditure of funds in FY 1978 for USDA supported research by agency and program subcategory

Program category	Source of funds (\$000)							Non-Federal	Total	
	AR	HNC	SEA		ESCS	FNS ¹	FSQS			Other Federal
			Hatch ²	1890 ³						
<u>Nutrient Requirements</u>										
Intake needs	0	1,152	121	57	0	0	0	121	1,451	
Methodology	0	125	0	0	0	0	0	0	125	
Subtotal	0	1,277	121	57	0	0	0	121	1,576	
<u>Nutrient Metabolism and Function</u>										
Function and pathways	465	1,729	339	165	0	0	0	467	3,907	
Interactions	0	190	235	0	0	0	0	83	894	
Bioavailability	533	851	183	63	0	0	0	29	353	
Methodology	0	612	50	11	0	0	0	202	940	
Subtotal	998	3,382	807	239	0	0	0	781	7,753	
<u>Diet/Health Relationships</u>										
Diet in long-term health	0	280	72	76	0	0	0	94	522	
Food constituents	0	826	374	9	0	0	0	137	1,990	
Obesity and disease	0	99	22	66	0	0	0	80	332	
Subtotal	0	1,205	468	151	0	0	0	217	2,844	
<u>Nutrition and Development</u>										
In growth and maturation	0	50	91	62	0	0	0	134	462	
In the aging process	0	0	5	0	0	0	0	36	48	
Methodology	0	0	0	0	0	0	0	0	0	
Subtotal	0	50	96	62	0	0	0	170	510	
<u>Nutrition Monitoring and Surveillance</u>										
Nutritional status	0	68	209	436	0	0	0	43	1,051	
Nutrients in the food supply	0	104	3	0	0	0	0	0	124	
Food consumption and practices	0	3,399	40	127	0	0	0	200	3,816	
Methods for nutritional status	0	151	31	358	0	0	0	2	618	
Methods for nutritional intake	0	40	84	0	0	0	0	0	187	
Subtotal	0	3,762	367	921	0	0	0	245	5,796	

TABLE 5.--Expenditure of funds in FY 1978 for USDA supported research by agency and program subcategory (cont'd)

Program category	Source of funds (\$000)									
	AR	HNC	SEA	1890 ³	ESCS	FNS ¹	FSQS	Other Federal	Non-Federal	Total
			Hatch ²							
Nutrition and Behavior										
Effects of diet and food constituents	0	0	0	0	0	0	0	0	0	0
Factors affecting food related behavior	0	0	20	0	0	0	0	0	67	87
Influence of environmental factors	0	0	312	304	0	0	0	23	357	996
Behavioral strategies to improve nutrition	0	0	0	0	0	0	0	0	0	0
Food behavior over the lifespan	0	0	0	0	0	0	0	0	0	0
Methodology	0	0	31	46	0	0	0	0	44	121
Subtotal	0	0	363	350	0	0	0	23	468	1,204
Studies Related to Nutrition										
Intervention Programs										
Changes in nutritional and health status	0	0	194	319	0	50	0	14	102	679
Comprehensive evaluations	0	1,019	1	30	0	2,744	0	0	0	3,794
Economic and social consequences	0	0	0	0	122	0	0	156	0	278
Management and operations evaluation	0	0	0	0	0	1,406	0	0	0	1,406
Methodology	0	0	5	0	0	0	0	0	2	7
Subtotal	0	1,019	200	349	122	4,200	0	170	104	6,164
Nutrition and Dietary Guidance										
Development and use of food guidance systems	0	289	0	0	0	0	0	0	0	289
Development and dissemination of information for consumer use of foods	0	323	11	0	0	0	0	308	2	644
Application of scientific knowledge to guidance materials	0	0	0	3	0	0	0	0	0	3
Subtotal	0	612	11	3	0	0	0	308	2	936

TABLE 5.--Expenditure of funds in FY 1978 for USDA supported research by agency and program subcategory (cont'd)

Program category	Source of funds (\$000)										
	AR	HNC	SEA		1890 ³	ESCS	FNS ¹	FSQS	Other Federal	Non-Federal	Total
			Hatch ²								
Nutrition Information Development and Delivery											
Design and testing of mixed and single media delivery strategies for use in intervention programs	0	0	33	13	0	511	0	0	0	34	591
Print and nonprint media development for use in nutrition information and education programs	0	0	17	0	0	420	0	0	0	0	437
Use of social marketing techniques	0	0	0	0	0	2,000	0	0	0	0	2,000
Assessment of public needs and wants	0	0	0	5	200	0	29	0	0	0	234
Subtotal	0	0	50	18	200	2,931	29	0	0	34	3,262
Nutrition Education and Training											
Community education programs--EFNEP, 4-H	0	0	0	0	0	0	0	0	0	0	0
Counseling programs for individuals and small groups	0	0	0	0	0	0	0	0	0	0	0
Development of curricula for use in schools and universities	0	0	24	0	0	49	0	0	0	12	85
Subtotal	0	0	24	0	0	49	0	0	0	12	85
Food Composition											
Analyses of foods for nutrients including fiber	290	381	123	37	0	0	0	266	115	1,212	
Analyses of other food constituents	0	0	15	0	0	0	0	0	14	29	
Food composition tables--National Nutrient Data Bank	0	758	0	0	0	0	0	59	0	817	
Nutrient analysis methodology--chemical and physical	0	381	27	0	0	0	6	0	19	433	
Nutrient analysis methodology--biological	0	395	16	0	0	0	8	0	5	424	
Subtotal	290	1,915	181	37	0	0	14	325	153	2,915	

TABLE 5.--Expenditure of funds in FY 1978 for USDA supported research by agency and program subcategory (cont'd)

Program category	Source of funds (\$000)							
	AR	IINC	SEA Hatch ²	1890 ³				Total
				ESCS	FNS ¹	FSQS	Other Federal	
Food Delivery Systems With a Focus on Diets, Nutrition, and Health								
Changes in agricultural practices designed to improve the nutrition quality of diets	66	0	67	0	0	0	1	101
Product development to conserve or enhance nutritional quality of diets	780	0	371	83	0	61	189	483
Food delivery systems that support or improve diet quality	0	0	52	10	0	0	0	69
Evaluation of food delivery systems for effect on nutritional quality of diets	0	0	47	0	0	0	0	61
Subtotal	846	0	532	93	0	61	190	714
TOTAL	2,134	13,222	3,220	2,280	322	7,180	2,428	4,590
						104		35,481

¹ Funds shown for FNS are for FY 1979.² Payments to Agricultural Experiment Stations under the Hatch Act.³ Payments to 1890 Colleges and Tuskegee Institute under PL 89-106.

There is about \$7.2 million in funding for the FNS program which is extramural under contract. The funding deals mainly with the evaluation of nutrition intervention programs, \$4.2 million, and the development and delivery of information systems, \$2.9 million. Among the programs being evaluated are the Special Supplemental Food Program for Women, Infants and Children (WIC); Child Nutrition Programs (CNP), the National School Lunch Program (NSLP), and the School Breakfast Program (SBP); and the Nutrition Education and Training Program (NET). Several projects are funded in State departments of public health throughout the country to study the nutritional impact of WIC. Studies of management and operations of the programs are being made with the goal of increasing participation by eligible individuals. The FNS program on information systems, \$2.0 million, includes developing and testing of multimedia techniques and a number of smaller projects for the design and testing of mixed media techniques for use with special groups.

Funds for FSQS research related to nutrition as defined in this inventory amount to \$104,000. Included is research to establish reference analytical methods for vitamin analysis for use with meat and poultry products as well as analysis for amino acids, iron, cholesterol, and protein efficiency ratios (PER) for mechanically processed meats. Also, a part of the research on the information that should be included on nutrition labels was used. Not all of the nutrition-related research in FSQS was included because much of the research was oriented to questions raised by regulatory programs and was not designed to provide much new nutrition knowledge.

Resources by program objective--In FY 1978, expenditures of approximately \$35,481,000 were made by USDA for research on human nutrition. A summary of the funds and scientist years by program category is given in table 4. Tables 5 and 6 give data on funds and scientist years, respectively, by supporting agency and program categories. The scientist years refer to the SEA, ESCS, and FSQS programs because the FNS work is extramural and data on scientist years are not available.

The first four categories, nutrient requirements and three closely related supporting research categories, nutrient metabolism and function, diet/health relationships, and nutrition and human development and performance, received about \$12.7 million, or 36 percent of the total funds and 43 percent of the scientist years of effort. Studies to determine optimal, lower, and upper ranges of nutrient intake received only about \$1.6 million, less than 5 percent of total funds. Only 6.1 scientist years, about 2 percent of the total, were employed in this work. The research on requirements was almost entirely supported by the Human Nutrition Center in SEA. The small proportion of the total effort on this high priority research reflects the high costs of facilities and support staff needed for controlled studies of human subjects. In FY 1978, the cost for this research on requirements was \$258,000 per scientist year. A much larger amount of funds, about \$7.8 million, or 22 percent of the total research funds, was spent on nutrient metabolism and function. The equivalent of 73.5 scientist years was employed in this work at an average SY cost of \$105,480. Another program category receiving emphasis in FY 1978 was nutrition monitoring

TABLE 6.--Scientist years reported for USDA supported research
in FY 1978 by agency and program category¹

Program category	Scientist years				
	SEA			ESCS	FSQS
	AR	HNC	Hatch ²		
			1890 ²		Total
Nutrient Requirements	0.0	3.8	2.0	0.0	0.0
Nutrient Metabolism and Function	11.2	26.1	30.2	0.0	0.0
Diet/Health Relationships	0.0	10.9	16.8	0.0	0.0
Nutrition and Development	0.0	0.5	2.4	0.0	0.0
Nutrition Monitoring and Surveillance	0.0	9.8	11.8	0.0	0.0
Nutrition and Behavior	0.0	0.0	9.7	0.0	0.0
Studies Related to Nutrition					
Intervention Programs	0.0	7.4	6.4	5.5	0.0
Nutrition and Dietary Guidance	0.0	8.3	0.0	0.0	0.0
Nutrition Information Development					
and Delivery	0.0	0.0	0.7	2.9	0.7
Nutrition Education and Training	0.0	0.0	0.7	0.0	0.0
Food Composition	4.1	25.6	5.0	0.0	0.5
Food Delivery Systems With a Focus					
on Diets, Nutrition, and Health	10.2	0.0	18.1	0.0	1.8
TOTAL	25.5	93.1	103.8	8.4	3.0
			32.7		266.5

¹Research funded by FNS is done extramurally and scientist year estimates are not available.

²Includes scientists supported by payments to Agricultural Experiment Stations under the Hatch Act and other Federal and non-Federal funds.

³Supported by payments to 1890 Colleges and Tuskegee Institute under PL 89-106.

and surveillance which included funding for analyses of a nationwide household food consumption survey. This category received about \$5.8 million, slightly over 16 percent of the total funds. Sixty-five percent of the funds for the program came from HNC and 16 percent from the 1890 colleges. About 13 percent of the funds came from other Federal and non-Federal sources.

Studies related to nutrition intervention programs received about \$6.2 million or 17 percent of the total funds. The work was mainly funded by FNS, about \$4.2 million, or 68 percent of the total for the category. The FNS program involved contracts to develop a comprehensive data base of ongoing work and to evaluate the nutritional impact of the action programs. About \$1.6 million, or 25 percent of the total for the category came from SEA. The largest single project amounting to \$1 million was funded by HNC to determine the nutritional benefits to participants of the Food Stamp Program (FSP) and the National School Lunch Program (NSLP) using data from the 1977-78 Nationwide Food Consumption Survey.

About \$3.3 million, slightly over 9 percent of the total research funds, were spent on the development and delivery of nutrition information. This work was funded primarily by FNS, 90 percent of all funds in the category, and performed extramurally. There were no other Federal funds and scant non-Federal funds, \$34,000, in this category. ESCS had a \$200,000 project concerned with consumer interests in the open dating of food products.

The program categories receiving the least support all undergird the success of applied nutrition programs. The three categories, nutrition and behavior, nutrition and dietary guidance, and nutrition, education and training together receive \$2.2 million, about 5 percent of the research funds.

About \$5.3 million, or 15 percent of the total funds, were spent on the two food oriented nutrition research categories. The food composition category received about \$2.9 million, 8 percent of the total funds, involving 36.1 scientist years. Research on food delivery systems focused on diets, nutrition and health received about \$2.4 million, 7 percent of the total funds, involving 31 scientist years. Most of the food composition research, which amounted to about \$2.4 million or 83 percent of the total in the category, is funded in SEA with the greater part, about \$1.9 million, or 66 percent, in the Human Nutrition Center. Studies administered by SEA-CR involve \$218,000, or slightly more than 7 percent. About \$290,000 or 10 percent of the total is research performed in SEA-AR. This research stresses the nutrient content of fresh fruits and vegetables at harvest and after storage and of retail cuts of meat.

Research on food delivery systems, as defined in this report, receives the largest proportion of non-Federal support, about \$714,000, or slightly more than 29 percent of the total funds for the category. About 60 percent, or \$1.5 million, comes from SEA and the remainder from FSQS and other Federal sources. SEA-AR accounts for \$846,000 or 40 percent of SEA-AR's total participation in the reported nutrition research program. An example of the SEA-AR studies is research on processing cereals, including enrichment methods for rice to minimize vitamin losses and increase nutritional value. SEA-CR also has a sizeable program in this research area.

Research programs by target populations--The number of research projects which used age, income, or population classifications was so small that detailed analysis by funds or manpower was considered inappropriate. Some general comments reflecting the program can be made. The segments of the population receiving most attention were adults, children, and adolescents. Most of the research which could be so classified was relevant to both men and women. Very few projects focused on the aged or infants and none studied the neonatal period. Very little of the research was on the special needs of pregnant and lactating women. The nutrients receiving the most attention were trace elements such as zinc, copper, and chromium; dietary carbohydrates including fiber; and dietary fat. There is not much work underway on vitamins and little or no work on energy needs.

The projects for which the income level of the target groups was identified were mainly in the nutrition monitoring and surveillance and nutrition and behavior categories. About one-half of the projects were focused on low-income families, the other half were not specifically for one income level. None of the projects was limited to middle- and high-income levels.

Urbanization (total size of the community) or the place of residence for the population studied was reported for several studies. Most of them included subjects from communities of several different sizes. Little or no work focused on inner-city or suburban residents. The greatest emphasis was on residents of rural farms and rural nonfarm dwellers. The research was mainly classified under the categories nutrition monitoring and surveillance and nutrition and behavior.

By far, the greater part of the research related to healthy subjects and their nutritional needs and practices. One-half of the research projects were identified as being related to health factors. The most frequently mentioned health factors were: heart and vasculatory problems, obesity, cancer, anemia, diabetes, hypertension, infant morbidity and longevity. None of the research focused on dental health or infant mortality.

A high proportion of the research involved human subjects. Program categories 5-10 (section II.A.3) are almost entirely directed to the study of human subjects, accounting for about 50 percent of the total research funds (table 4). Research on food, categories 11 and 12, received about 15 percent. The remaining program categories (1-4), which receive about 35 percent of the total research dollars, are those in which model systems are frequently used instead of human subjects because of ethical, cost, time factor, and other considerations. Human subjects were most frequently used in research on nutrient requirements and the bioavailability of food, a subcategory under nutrient metabolism and function. About one-half of the funds in these categories have been estimated as being used in studies of human subjects. The remainder of the research made use of a variety of model systems. The category of rodents and other laboratory animals was the most commonly used model system. A few studies used subcellular systems, cells and tissues, or microorganisms. Primates were the least used model.

Research on methodology--Each committee report analyzing research priorities in nutrition has emphasized the need for improved methodology to speed up results, reduce costs--both funds and manpower--and solve complex problems. For this reason, methodology was included as a subcategory for most objectives. Data on funds and manpower are shown by program category in table 7. Rapid, reliable, and sensitive methods providing results which permit comparison of findings from different studies and different researchers are needed for the most effective use of dollars spent on research. About \$2.8 million, or 10 percent of nutrition research funds in SEA, were directed to methodology research. The equivalent of 31 scientist years was involved. FSQS spent a small amount, about \$14,000, on improving analytical methods for nutrient analysis. Most of the SEA research on methodology comes under HNC except for research on methods for nutritional status studies. Sixty percent of funding for these studies comes from the 1890 colleges in the amount of \$358,000 and 5.7 scientist years.

Non-USDA federally funded research--Slightly under \$2.4 million of non-USDA Federal funds were included in the CRIS summary of expenditures for human nutrition research in FY 1978. This amounted to 6.8 percent of the total funds reported. SEA-CR and its cooperators received about \$1,364,000 of the funds, or 56 percent; and HNC about \$771,000, or 32 percent. SEA-AR and ESCS each received about \$150,000 or 6 percent of the total funds from other Federal sources for nutrition research.

TABLE 7.--Scientist years and expenditure of funds
in FY 1978 for research on methodology

Program category	Scientist years	Funds (\$000)
Nutrient Requirements	1.4	125
Nutrient Metabolism and Function	7.0	940
Nutrition and Development	0.0	0
Nutrition Monitoring and Surveillance		
nutritional status	7.9	618
nutrient intake	2.3	187
Nutrition and Behavior	3.6	121
Studies Related to Nutrition Intervention Programs	0.2	7
Food Composition		
analytical methods	3.8	427
biological methods	4.8	416
Total	31.0	2,841

¹Based on 386 projects selected as relevant to human nutrition reported in CRIS for FY 1978.

Non-Federal funds supporting nutrition programs--In FY 1978, approximately \$4.6 million of non-Federal funds were used for the nutrition research projects reported in CRIS that were also partly supported by USDA funds (table 8). This represents about 13 percent of the total funds. Most of these funds, almost \$3.9 million or 85 percent, represent State support. Additional funds used were (a) from product sales, \$124,000 or about 3 percent; industry grants, \$182,000 or 4 percent; and (b) from all other sources, \$392,000 or slightly over 8 percent. These funds are almost entirely in support of research performed in cooperating institutions and administered by SEA-CR.

When all State agricultural experiment stations (SAES) human nutrition related projects in CRIS were considered, the State appropriated funds were about \$5.6 million, about \$1.7 million more than when only those projects partially funded by USDA were included. The major research emphasis of State funds was on the metabolism and function of nutrients, 33 percent; about 15 percent each was spent on research on diet/health relationships and food delivery systems; slightly less, around 10 percent each, was spent on research on nutrition monitoring and surveillance and nutrition and behavior. A larger proportion of State funds was spent on the first three categories listed above than total SEA funds. However, less State support was placed on nutrition monitoring and surveillance than the SEA average of 21 percent. Another category receiving greater SEA emphasis was food composition, where the SEA average was 10 percent of total funds compared to 4 percent by the States.

TABLE 8.--Expenditure of non-Federal funds in FY 1978 by program category¹

Program category	Source of funds (\$000)				Total
	State	Product sales	Industry	Other non-Federal	
Nutrient Requirements	116	5	0	0	121
Nutrient Metabolism and Function	1,284	44	87	130	1,545
Diet/Health Relationships	579	15	14	195	803
Nutrition and Development	122	0	3	8	133
Nutrition Monitoring and Surveillance	471	2	18	11	502
Nutrition and Behavior	437	24	8	0	469
Studies Related to Nutrition					
Intervention Programs	102	2	0	0	104
Nutrition and Dietary Guidance	2	0	0	0	2
Nutrition Information Development					
and Delivery	34	0	0	0	34
Nutrition Education and Training	12	0	0	0	12
Food Composition	131	18	1	3	153
Food Delivery Systems With a Focus					
on Diets, Nutrition, and Health	598	14	51	45	708
TOTAL	3,888	124	182	392	4,586

¹Based on 386 projects selected for relevancy to human nutrition research as used in this study and for which there were expenditure data in CRIS for FY 1978.

Product sales accounted for less than 3 percent of the non-Federal funds. About one-quarter of the \$124,000 was spent on research on food composition and food delivery systems.

Industry provided \$182,000, about 4 percent of the total funds. About one-half was used for research on nutrient interactions in metabolism; about 28 percent was for research on food delivery systems, and the remainder was shared among the other program areas. Industry funds did not support research on nutrient requirements, studies related to nutrition intervention programs, nutrition and dietary guidance, nutrition information development and delivery, and nutrition education and training programs.

Competitive research grants program--This program was begun in FY 1978 and thus there were no expenditure data for that year. The obligations incurred and the program category strengthened by additional research are given in table 9 for FY 1978 and FY 1979. A total of \$9.1 million has been obligated. Research related to the broad area of nutrient requirements has received about \$5.6 million or 61 percent of the total. Slightly more than \$1 million was approved for research in nutrient requirements, a valuable supplement to the approximately \$1.6 million spent by SEA-HNC in FY 1978. Nutrition monitoring and surveillance received about \$1.7 million and research on the nutrient composition of foods about \$0.5 million. Nutrition and behavior received \$0.7 million, although this is an aspect of nutrition science where there are little scientific research data and much information is needed. In FY 1980, funds appropriated for this program have been reduced from \$5 million to \$3 million on an annual basis.

TABLE 9.--Funds obligated in FY 1978 and FY 1979 for the
Competitive Research Grant program by program category

Program category	Funds (\$000)	
	FY 1978	FY 1979
Nutrient Requirements	454	634
Nutrient Metabolism and Function	1,310	996
Diet/Health Relationships	410	1,349
Nutrition and Development	155	255
Nutrition Monitoring and Surveillance	875	816
Nutrition and Behavior	455	258
Studies Related to Nutrition Intervention Programs	75	0
Nutrition Information Development and Delivery	0	28
Nutrition Education and Training	175	150
Food Composition	350	189
Food Delivery Systems With a Focus on Diets, Nutrition, and Health	0	175
TOTAL	4,259	4,850

B. Nutrition Education in the Cooperative Extension Service

1. Methods Used to Collect Data from State Extension Services

Nutrition education has long been a part of the agriculture and home economics education provided to the public by the Cooperative Extension Service staff. Each State land-grant institution, with the support of nutrition specialists, is responsible for conducting educational programs utilizing extension home economists who are located in the counties. The content and delivery strategies of these programs differ according to the needs of the people and the characteristics of the communities.

In addition to being part of the traditional Extension home economics and agricultural programs, nutrition education in Extension is also provided through the Expanded Food and Nutrition Education Program (EFNEP), which uses paraprofessionals trained by home economists in selected counties to provide intensive nutrition education to low-income families with young children. Federal funding for EFNEP was approximately \$50 million in FY 1979; the prorated Federal share of funding for the long-standing general nutrition education program was approximately \$9 million.

Federal funds from SEA-Extension for State Extension nutrition programs are supplemented by funds from other sources. Data are not available to permit provision of precise information about the extent of these contributions, but estimates can be made. State and county contributions to EFNEP totaled \$5.1 million in 1975, while Federal contributions other than those specifically designated for EFNEP totaled \$2.2 million. Thus, in 1975, the last year such figures were available, the EFNEP budget was supplemented by about 15 percent for a total of about \$58 million. There is no reason to think this supplemental level has changed much in the last few years.

In 1978 the SEA-Extension funds for all State Extension home economics programs were \$78 million, and supplementary funds from all other sources for these programs totaled \$95 million. If the EFNEP share of both these categories is subtracted, then the general nutrition program can be estimated to be supplemented by 270 percent. Using this figure, an estimate of total budget for the general nutrition program would be approximately \$33 million. This type of analysis, although based on estimates, provides an indication of the degree of support for Cooperative Extension work legislated in the Smith-Lever Act.

The national program is an aggregate of all the county and State programs. Consequently, provision of information about Extension nutrition education requires surveying the States for most recent practices.

In response to the Joint Council request, a questionnaire was prepared that would obtain information from each State in such a form that:

1. It fit in customary lines of programing by Extension faculty.
2. Data requested were general enough that it was feasible for all States to complete the questionnaire.
3. Subject matter education categories corresponded as closely as possible to nutrition research categories.
4. Data could also be used for other purposes, specifically for response to congressional questions about methodology and nature of clientele groups in Extension nutrition programs.

A copy of the questionnaire and the covering letter are in attachment 3. This material was sent to all Extension directors or administrators in land-grant institutions (1862 and 1890) in July 1979.

2. Content, Educational Methods, Clientele Groups

State Extension directors were asked to provide information about specific content, educational methods, and clientele groups in Extension nutrition programs in their States. Requests were made for work years expended in each category in the last fiscal year as well as for future priorities.

Content--Four broad subject matter categories were used:

1. Food buying and preparation, food composition, cost comparisons.
2. Diet and health (including obesity, heart disease, dental health).
3. Diet and motivation (effects of food advertising, peer pressure, use of ethnic and/or fast foods).
4. Food preservation and food safety.

Categories 1 and 4 are primarily oriented toward food handling by the consumer. Category 2 is more involved with nutrition principles and category 3 with environmental factors influencing food selection practices.

Respondents were also given the opportunity to indicate effort in areas not included in the categories above.

Methodology--Directors were asked to estimate the time spent and importance of four broad categories of preparing or utilizing specific nutrition education methods. The four broad nutrition activities are:

1. Individual counseling and education.
2. Group education.
3. Mass media.
4. Development of materials and teaching aids.

Clientele--Directors were asked to estimate time spent delivering nutrition education to:

1. Clientele at different stages of the life cycle; that is, families with young children, teenagers, older adults, other adults.
2. Clientele from different ethnic groups (black, Hispanic, Indians, white, other).
3. Clientele from families earning less than or more than \$10,000 per year.
4. Clientele living in population centers of less than or more than 20,000.

3. Results from State Surveys

Responses were obtained from fifty-three land-grant institutions. The findings are summarized in tables 10 and 11. Responses from some of the 1862 institutions included a breakdown into paraprofessional and professional effort. Others submitted totals on professional time only. Data were limited. However, it was possible to estimate the amount of time spent nationwide in each category by professional and paraprofessional Extension staff involved in nutrition education. The findings from the survey are discussed in section III.C.2. along with identification of programs needing strengthening.

TABLE 10.--Projection of Extension work years based on raw data as reported by States*

Section I - Content areas	Paraprofessional		Professional		Total**	
	% time	Work years	% time	Work years	% time	Work years
1. Food buying & preparation, food composition, cost comparisons	43	1,599	32	529	45	2,417
2. Diet and health (including obesity, heart disease, dental)	30	1,115	32	529	25	1,343
3. Diet and motivation (effects of food advertising, peer pressure, use of ethnic, fast foods)	10	372	10	165	9	483
4. Food preservation and food safety	12	446	21	347	16	860
5. Other. If major identify it	5	186	5	83	5	269
TOTAL WORK YEARS		3,718		1,654		5,372
Section II - Time spent utilizing specific methods and materials						
1. Individual counseling and education	71	2,640	33	546	54	2,901
2. Group education	20	744	39	645	25	1,343
3. Mass media	3	112	12	198	9	483
4. Development of material and teaching aids	6	223	17	281	11	591
TOTAL WORK YEARS		3,718		1,654		5,372

TABLE 10.--Projection of Extension work years based on raw data as reported by States* (cont'd)

		Paraprofessional		Professional		Total**	
		% time	Work years	% time	Work years	% time	Work years
<u>Section III - Time spent teaching nutrition to clientele groups</u>							
1. Families with young children	78	2,900	29	480	54	2,901	
2. Teenagers	9	335	14	232	10	537	
3. Older adults	2	74	11	182	9	483	
4. Other adults	9	335	39	645	23	1,236	
5. Commercial/professional/other agency staff	1	37	7	116	4	215	
TOTAL WORK YEARS		3,718		1,654		5,372	
<u>Section IV - Time spent reaching specific ethnic groups</u>							
1. Black	28	1,041	25	414	26	1,397	
2. Hispanic	15	558	6	99	7	376	
3. Indians	2	74	2	33	2	107	
4. White	53	1,971	66	1,092	64	3,438	
5. Other	2	74	1	17	1	54	
TOTAL WORK YEARS		3,718		1,654		5,372	

TABLE 10.--Projections of Extension work years based on raw data as reported by States* (cont'd)

	Paraprofessional		Professional		Total**	
	% time	Work years	% time	Work years	% time	Work years
Section V - Time spent reaching groups with specific income level						
1. Families earning under \$10,000/year	99	3,718	45	744	82	4,405
2. Families earning over \$10,000/year	1	37	55	910	18	967
TOTAL WORK YEARS		3,718		1,654		5,372
Section VI - Time spent reaching people in specific type of residence						
1. Farm and rural people in communities of less than 20,000	45	1,673	53	877	53	2,847
2. People in communities of more than 20,000	55	2,045	47	777	47	2,525
TOTAL WORK YEARS		3,718		1,654		5,372
Section VII - Time spent administering food and nutrition programs in your State						

*These figures are based on the assumption that the sample of States submitting complete breakdowns is representative of all States.

Work years for each category are obtained by calculating total FTE for each section and then using same proportions found in raw data. The total FTE is that estimated for 50 States, Puerto Rico, and the District of Columbia.

**Estimated work years shown in this column were obtained separately from the estimates of time spent by paraprofessionals and professionals. Therefore, figures in columns 2 and 4 do not necessarily add up to figures in the total column.

TABLE 11.--Nutrition education in the Cooperative Extension Service:
 Priorities for areas to increase effort
 (Number of States indicating area was high priority)

	Number of States indicating high priority
<u>Section I, Content areas</u>	
1. Food buying and preparation, food composition, cost comparisons	17
2. Diet and health (including obesity, heart disease, dental)	26
3. Diet and motivation (effects of food advertising, peer pressure, use of ethnic, fast foods)	14
4. Food preservation and food safety	13
5. Other. If major identify it	0
<u>Section II, Time spent utilizing specific methods and materials</u>	
1. Individual counseling and education	1
2. Group education	21
3. Mass media	32
4. Development of material and teaching aids	15
<u>Section III, Time spent teaching nutrition to clientele groups</u>	
1. Families with young children	25
2. Teenagers	24
3. Older adults	15
4. Other adults	4
5. Commercial/professional/other agency staff	10
<u>Section IV, Time spent reaching specific ethnic groups</u>	
1. Black	17
2. Hispanic	16
3. Indians	9
4. White	8
5. Other	9
<u>Section V, Time spent reaching groups with specific income level</u>	
1. Families earning under \$10,000/year	19
2. Families earning over \$10,000/year	8
<u>Section VI, Time spent reaching people in specific type of residence</u>	
1. Farm and rural people in communities of less than 20,000	16
2. People in communities of more than 20,000	6

C. Higher Education

It is only within the last few decades that nutrition has evolved as a separate, specialized field of study within colleges and universities. There appears to be considerable recent growth in the number of higher education institutions offering course work and/or degrees in nutrition. The newness of nutrition as a specialized field of study and the fact that it has its roots in several different disciplines and professional areas result in lack of clear information or education statistics related to nutrition programs per se in colleges and universities. Many practicing nutritionists received their training in basic and clinical sciences and crossed over into nutrition during graduate, postgraduate, and professional work. This further complicates the collection of nutrition education statistics.

1. Persons Educated in Nutrition Programs

The study of nutrition began in other areas of study, including home economics, public health, animal science, and biochemistry. Many other disciplines have contributed to its development, including physiology, medicine, food science, and behavioral sciences. Home economics has traditionally taken responsibility for educating dietitians and has provided a significant number of extension workers, educators, and scientists with an orientation to human nutrition and consumer nutrition problems. Public health has educated field specialists working with epidemiological aspects of nutrition and with maternal and child health programs. Animal science, through its concern for animal health and nutrition, has contributed much to fundamental understanding of nutrient requirements. Biochemistry

contributed much of our information on nutrient identity, metabolism, and function. Certain individuals in these fields have been identified by others and also identify themselves as nutritionists. In some ways their training and interests are similar; their perspectives on nutrition are somewhat different, and there are important differences in their knowledge and skills.

The dietitian has undertaken an educational program designed to impart skills and knowledge in nutrition, supplemented with skills and knowledge in the operation of food services and in management functions. Closely related is the food service (institution) management person who has basic skills and knowledge in management of food services and associated operations, supplemented with some knowledge and skills related to food and nutrition. Also related is the home economist who has basic skills and knowledge in the management of a variety of family resources, supplemented with skills and knowledge in food and nutrition. The public health nutritionist has considerable skill and knowledge in nutrition coupled with skills in planning, organizing, and implementing health programs. Many public health nutritionists have special expertise in epidemiology. Animal scientists have special skills and knowledge related to the production of domestic animals for human consumption, supplemented to varying degrees with knowledge of the relationship of feeds (nutrients) to the health and performance of the animals. The biochemist has knowledge of biological structure and metabolism at the cellular and subcellular levels, and to a varying degree has related this to dietary requirements for compounds needed within the cell.

Some nutritionists (and dietitians) from home economics and others from public health (and to a lesser extent from other disciplines) have chosen to specialize in nutrition education. Many of these individuals have, in addition to knowledge of food and nutrition, skills and knowledge in education methods, evaluation of education programs, and learner behavior. Among these, as well as among others in public health and home economics, one can find certain individuals who specialize in community health programs and/or community education programs and are identified as "community nutritionists."

Within the food industry there are several types of people identified as nutritionists who have received some of their education at colleges and universities. Some of these are dietitians and nutrition scientists with extensive training in nutrition. Others are home economists or food scientists with varying degrees of skill and knowledge in food and nutrition.

Thus, the term "nutritionist" is used to describe people with a great variety of skills and knowledge and having degrees from very different educational programs. It is apparent that there may be a need to distinguish between these types of programs when assessing the status of nutrition programs in higher education. Unfortunately, data that would allow one to look at nutrition programs are not routinely collected. Very often the data are compiled only under the broad headings of home economics, dietetics, public health, agriculture, and biological sciences. Thus, a look at nutritionists within these fields is difficult. Some of the data are collected in a fashion that would allow some breakout of data related to nutrition. However, this breakout is not done routinely. For example, it would be necessary to examine National Center for Educational Statistics data tapes with special questions as to enrollment in nutrition programs and institutions granting

degrees in nutrition to get this information. The Department of Agriculture has begun an assessment of manpower needs and supply that will include some data designated by specific fields such as nutrition. For example, by the end of this year there will be information on nutrition faculty and programs in over 800 institutions that offer home economics and agricultural programs. It will be necessary to supplement these data with information on programs in other areas, such as the biological and health sciences.

2. Higher Education Programs in Nutrition

Colleges and universities confer one or more degrees in nutrition, including the bachelor of science (B.S.), the master of science (M.S.), the master of public health (M.P.H.), the doctor of medicine (M.D.), the doctor of science (D.Sc.), and the doctor of philosophy (Ph.D.).

Degree programs leading to the B.S. degree vary considerably from one institution to another and reflect the major area within which they reside (such as home economics or agriculture) and the breadth and depth of the faculty responsible for the program. The largest numbers of students receiving B.S. degrees probably are in dietetics programs approved by the American Dietetic Association (ADA). The ADA also accredits certain programs that have a clinical experience component, such as post baccalaureate internships and coordinated undergraduate programs. Thus, the educational experience of the majority of students with a B.S. in nutrition has a common core of knowledge and skills. A great deal more variation exists at the B.S. level when one examines the nutrition component of programs for

students in home economics, animal science, food science, and food service management. For example, the Institute of Food Technologists provides guidelines for undergraduate programs; within those guidelines a food science student may complete much or only a small amount of nutrition course work. Home economics students may have considerable course work in food and nutrition, or they may have no course work in these areas.

At the level of the Master's degree, the Master's in public health is the most carefully described and controlled program. The Association of Faculties of Graduate Programs in Public Health Nutrition has developed guidelines for these programs, for specializations, for education and training of university teachers of public health nutrition. For M.S. degree programs and Ph.D. programs, there are no overall guidelines provided by any professional group; thus, each institution and program faculty set these requirements, and much variation exists.

The American Institute of Nutrition (AIN) conducts an informal, voluntary survey of graduate nutrition programs around the country. The most recent survey was in 1978-79, and no report has appeared describing information received. In the current returns, they list about 50 institutions with doctoral programs in nutrition.

Estimates of Numbers of U.S. Institutions
Offering Graduate Degrees in Human Nutrition¹

<u>Degree</u>	<u>Number</u>
Ph.D. (human nutrition)	50
M.S.	75
Master's (public health nutrition)	16
Doctoral (public health nutrition)	2

¹Estimated from information supplied by American Institute of Nutrition, Faculties of Graduate Programs in Public Health Nutrition, and National Nutrition Consortium, Inc., 1978-79.

However, the number of students enrolled, the size of the faculty, and breadth and depth in course offerings and research programs are not indicated. The National Nutrition Consortium indicates a list of 72 institutions offering graduate nutrition programs obtained from the previous AIN survey. Estimates of enrollments are lacking. However, the National Research Council (NRC) estimates that about 80 students (1,2) obtained a doctorate in nutrition or dietetics in 1976 and in 1977. During the years 1971-75, NRC estimates that 40 students (3,4) each year received the doctorate in nutrition and food science. In either case, whether the number is 40 or 80 earned Ph.D.'s a year, the data suggest that many (or most) of the nutrition graduate programs are quite small. Projected data from a survey to be completed by USDA this winter (1980) will tell something about student enrollment, graduates, and the size of the faculty in nutrition programs within some 800 colleges and universities that have programs in home economics and agriculture. The National Center for Educational Statistics does not currently report data that allow clear separation of nutrition students from

those in other related fields. However, data obtained with improved classification systems is expected to be available with 1-2 years. Currently, many nutritionists (and nutrition programs) continue to be "hidden" in other categories.

3. Financial Support for Graduate Students

The support available for graduate students will determine to some extent the number of students enrolled for graduate training in a given field of study. Just how strong the correlation is between increases or decreases in support and increases or decreases in enrollment is not clear. In the NRC survey (3) of people who had earned doctorates in nutrition and food sciences between 1971 and 1975, about two-thirds of the respondents said that financial support had been critical in their choice of graduate study in that area. The source of support that the respondents reported is indicated below:

Percentage of Graduate Students in Nutrition and Food Science receiving Financial Support from Various Sources in FY 71-75¹

Source of funds	Percentage of students				
	Average	1st yr	2nd yr	3rd yr	4th yr
NIH-TG	20	22	21	19	20
Other Federal	19	16	23	23	23
Fed. Res. Grant	9	2	3	15	11
Univ. or State	33	36	33	29	33
Personal	15	19	12	12	16
Other	5	5	7	2	7

¹ Personnel Needs and Training for Biomedical and Behavioral Research, 1977. NRC-NAS, pp. 36-37.

Federal funds supported 48 percent of the students, university and State funds supported 33 percent, and personal funds supported 15 percent of the students responding to the questionnaire. National Institutes of Health (NIH) training grants supported about 20 percent of the respondents' training. If this were extrapolated to the total estimated population, it would imply training of somewhere around 50 students a year. NRC data for 1977 show NIH support for 48 people, 41 of whom were trainees. NIH has reported (5) supporting training for 86 predoctoral and 64 postdoctoral trainees in FY 1977. The difference in figures reported probably is accounted for by differences in the fields in which trainees were classified. State funds accounted for 33 percent of support for graduate training. This includes use of State funds for teaching assistantships and special fellowship funds. Some Hatch project support of graduate student stipends is also counted in this category. Six respondents in the NRC survey were currently in postdoctoral positions and two-thirds were supported by training grant funds, one by a Federal research grant, and one by university/State funds. When asked how their research was being supported, respondents who had earned Ph.D.'s in nutrition and food science between 1971 and 1975 indicated that 57 percent of their support was Federal and 43 percent non-Federal.

No attempt has been made to collect data on support of students currently enrolled in nutrition programs. Nutrition program respondents to the 1978-79 AIN survey were asked to say what percent of their students were receiving financial support. Answers varied considerably, but the answer most often given was that over 80 percent were receiving support.

Data are inadequate as to the form of financial support, source of support, and level of support for graduate students in nutrition. Further, questions remain as to the precise relationship between financial support and quality or numbers of students enrolled. It is probable that adequate funds for financial support would allow nutrition programs to compete more successfully for the better students. However, there are no data to substantiate this or show to what extent it might be true.

4. Employment of Nutritionists

Bureau of Labor statistics on employment are categorized in such a way that it is difficult to single out the employment of nutritionists. Thus, other less complete sources of data must be relied upon. The American Dietetic Association has some data on employment of dietitians, the American Home Economics Association has some data on employment of home economics-related nutritionists, and DHEW has some data on employment of nutritionists in health related areas. However, the data are not all available in updated forms and do not lend themselves to coordinated analysis.

At the baccalaureate level, many students specializing in nutrition are, in fact, specializing in dietetics. The employment of these students in health related fields can be examined using the data from DHEW. At the doctoral level, data from the NRC (3) survey of doctoral recipients from 1971-75 indicates something of the employment pattern for that stage of career development. It was estimated that in 1976, of 206 people receiving Ph.D.'s in nutrition or food science from 1971-75, 85 percent were employed full time and 5 percent were seeking employment. Of those employed,

81 percent were in educational institutions, 14 percent in business, and 1.5 percent in government. Eighty-nine percent of the respondents reported spending some time in research, 37 percent reported time in teaching. Among the respondents, 75 percent said the doctorate was essential for their present position and 17 percent said it was helpful. Twenty-four percent of the persons receiving a doctorate in nutrition had switched to another field. Fifty-one percent of the persons holding a nutrition position had received their doctorate in another field. Thus, an estimated 252 people receiving their doctorates (in any field) during 1971-75 were employed in nutrition positions.

The 1978 National Academy of Sciences report (4) presents the results of a survey of departments within colleges and universities regarding employment of Ph.D. graduates. Forty-one departments responded to the questionnaire. Of these, 24 percent said there is a critical shortage of Ph.D.'s and 41 percent said there is a moderate shortage. Thirty-three percent estimated a market balance and 2 percent said there was a moderate surplus of Ph.D.'s in nutrition and food science.

In summary, it will be difficult to estimate current manpower in nutrition or to project manpower needs for the next several years.

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5. Program in Biomedical and Behavioral Nutrition Research and Training Fiscal Year 1977. NIH, DHEW, June 30, 1978.

D. Other Nutrition Education and Information Programs

In addition to the major program in nutrition education carried out by the Cooperative Extension Service, which is described in section II.B., there are several other important education and information programs which should be included in this inventory. These include the information programs of the National Agricultural Library (TIS-SEA). the education programs of the Food and Nutrition Service, and, more recently, those of the Human Nutrition Center (SEA).

The Food and Nutrition Information and Education Resources Center of the National Agricultural Library provides serials, monographs, and audiovisual aids on foods, nutrition education and research, and food service management. The center's services, including lending, reference, and computer on-line retrieval of information, are available to educators, dietitians, nutritionists, cooperative Extension personnel, people working within the child nutrition programs of the Department, and other interested persons. The budget for this program in FY 1979 was approximately \$475,000.

Among the programs of the Food and Nutrition Service, two education programs are of particular significance. The first is the rather substantial effort in nutrition education which is carried out through State departments of education in the public and private schools. This program is known as the Nutrition Education and Training Program (NET) and was initiated in 1977. The initial appropriation of \$26 million for FY 1978 and FY 1979 was distributed to States in the form of grants based on a formula of 50 cents per child enrolled in schools and institutions, with no State receiving less than \$75,000. As of July 1979, 46 States, in compliance with regulations of the Food and Nutrition Service, had appointed State coordinators for nutrition education and training, had conducted assessments of their States' needs for nutrition education and training, had submitted State plans to meet their needs, and had begun to implement their plans.

The NET program is based on four principles:

1. Children need to learn the relationship between food and health;
2. The School Breakfast, School Lunch, and Child Care Food Programs should be used as learning laboratories for nutrition education;
3. Inservice training in nutrition for teachers and food service workers should help forge a link between a child's classroom and cafeteria learning experiences;
4. These nutrition education programs are for all children in public and private schools, residential child care institutions, and day care centers.

The NET program is currently being evaluated under contract by an independent non-governmental organization.

A second nutrition education program of the Food and Nutrition Service is that of the education component of WIC, the supplemental food program for women, infants, and children. This program is directed to groups which are particularly at risk for poor nutrition; that is, pregnant and lactating women and infants. In FY 1979 this education program associated with WIC was funded at the level of \$18 million.

The nutrition education and information activities of the Human Nutrition Center are of three types:

1. Translating, interpreting, and transmitting research findings into reliable, acceptable food and diet guidance for the public and special groups;

2. Performing scientific and technical review and clearance on all nutrition information released from USDA;
3. Coordinating nutrition education and information programs of units of the Science and Education Administration and providing consultation, on request, to other Federal and non-government organizations.

The Human Nutrition Center and the Office of Governmental and Public Affairs (GPA) develop the majority of print and nonprint media on nutrition for the general public. The funding from the Human Nutrition Center for these programs has been estimated at \$0.5 million in FY 1979; whereas, the GPA contribution was about \$1.0 million.

III. HUMAN NUTRITION RESEARCH, EXTENSION AND EDUCATION: PLAN FOR IDENTIFICATION OF PROGRAM GAPS

A. Assumptions and Overview

In the past decade, numerous reports by scientific and public policy groups have been critical of government's role in human nutrition. Critics speak of the importance of a vigorous, well-organized national program in human nutrition capable of improving the food and nutrition situation of the world's population. USDA's lead agency status in food and agriculture gives it a central role in the world food and nutrition picture, capable of making a significant contribution to the solution of world hunger and malnutrition and prevalent diet-related chronic diseases.

The purpose of this analysis of gaps and coordination problems is to strengthen the capability of the USDA and its cooperators to respond effectively to present and future human nutrition needs. Expansion in human nutrition knowledge and the technological capabilities of the field to address problems, as well as changes in the social and economic contexts in which human nutrition problems are set, suggest the need to reexamine old assumptions about the purposes, goals, and strategies available to solve nutrition problems.

Although this analysis focuses on gaps and inadequacies, it is not meant to suggest that strengths do not exist in human nutrition efforts currently underway. The Department of Agriculture's human nutrition activities are part of a larger framework of research and education in which the essential feature is a unique partnership between Federal, State, and county performers. This feature--cooperative activity based on mutual

agreement among several partners--is a major strength of the system and also adds to its complexity. However, this very diffusion and diversity carries with it added opportunity for innovation, needs identification, new methodologies, and much expanded financial resources. It does make necessary more careful planning, goal setting, and coordination at national levels which can in turn be utilized effectively in the structures representing the State and county organizations and local groups. Funding policies, roles, and mission definitions at national levels must be clear and must be clearly communicated to the other partners in this cooperative endeavor.

The approach suggested is to match the charges contained in the Food and Agriculture Act of 1977 and major issues, concerns, and recommendations in published reports against the documented description of human nutrition activities currently underway in the agricultural system. The product of this analysis will be a report identifying major discrepancies between identified problems and the scope of activity now underway.

B. Analytic Strategy

The identification of work needed but not underway is a diagnostic exercise. It is not enough to examine evidence of need--for example, prevalence of diet-related health problems or lack of knowledge of nutrition among consumers--and conclude that more effort is needed. One must determine what specific kinds of effort need to be initiated or enhanced. Evidence of need is the starting point for the diagnosis, but the additional work needed might be any activity--ranging through the development of new knowledge to the utilization of knowledge--that has an impact on that need. The strategy

taken in the present study is to (a) take for the scope of the study three areas of work (research, education of consumers, and the supply and training of professionals), (b) classify the work in each area as finely as possible into categories that are meaningfully related to ultimate need, and (c) examine activities within and linkage among categories according to some criterion for adequacy. Ideally, this would be done in the context of a fully specified systems model that could account for all variables that have an impact on the nutritional health of consumers and that could display assumptions on the social, economic, technological and other environments on which the analysis was based. The model could also develop its conclusions from precise, objective criteria. That degree of comprehensiveness, objectivity, and precision is not possible, given the fragmentary and imprecise nature of the information available. The procedure followed in the present study is a more modest one: to examine the categorized activities in light of the responsibilities designated in the Food and Agriculture Act of 1977 and published recommendations in reports that express the views of those who have studied the problem.

C. Work Needed but not Underway

1. Research

The Food and Agriculture Act of 1977, Section 1421(a) stated "...that there is insufficient knowledge concerning precise human nutritional requirements, the interaction of the various nutritional constituents of food, and differences in nutritional requirements among different population

groups such as infants, children, adolescents, elderly men and women, and pregnant women; and that there is a critical need for objective data concerning...the potential of food enrichment and means to encourage better nutritional practices." In order to carry out the policy of the 1977 act as outlined in subtitle D--National Food and Human Nutrition Research and Extension Program, most of the intramural USDA supported nutrition research was transferred to a newly established Human Nutrition Center (HNC) in the Science and Education Administration (SEA) in December 1978. The HNC has responsibility for coordination of all human nutrition programs in SEA.

The HNC has defined the research component of its program as dealing primarily with the interactions between the body and its food supply with the ultimate purpose of defining quantitatively the food requirements for any combination of physical and mental functions. The definition includes studies designed to assess the effects of food or nutrient intake, utilization, and/or storage on all possible combinations of body functions involved in growth, activity, reproduction, lactation, and other physiological aspects of the life cycle. The research also includes studies designed to improve nutrition education methodology as well as studies of the nutrient composition of foods where the primary purpose is to establish their nutrient quality.

The ongoing (FY 1978) program in human nutrition research, as reported in the inventory, section II.A., has been considered in relation to both the 1977 Food and Agriculture Act statements and the HNC definition of human nutrition research. The inventory does not provide the kind of information needed to identify gaps in nutrition knowledge. It does provide a measure of the research effort on high priority nutrition problems that were supported by USDA funds at the time the inventory was made.

The inventory showed that the USDA was supporting little or no research on the nutritional requirements of infants and the aged, very little work on children and adolescents, and almost none on pregnant and lactating women. Nutritional needs of all of the these groups were identified as insufficiently understood in the 1977 act. The funding situation has improved, and by FY 1980 support had increased by \$2.0 million for research on the aged and \$2.5 million for research on infants, pregnant and lactating women, amounting to an increase of 40 percent in funds since FY 1978 on research in the broad area of requirements (categories 1-4 of the inventory, section II.A.2.). These funds are part of the funding of new USDA human nutrition laboratories in Boston, Massachusetts, and Houston, Texas. The amount, complexity, and costliness of the research to be done and the urgent need for the information could call for an additional doubling of the funds and broadening of the research to include young children. Six of the research review reports discussed in section I.C.1. gave priority to research on the requirements of infants and young children and seven noted a priority need for such work on pregnant women.

Research on factors affecting food choices was given priority for study in seven of the reports reviewed in section I.C.1. The inventory (section II.A.4.) showed that research on nutrition and behavior is one of the less well supported categories, yet this research is needed to back up nutrition education programs. All of the research was done by cooperators. Some additional funds have been made available to the HNC for research on people's behavior toward food.

Nine of the reports reviewed in section I.C.1. commented on the need to study factors influencing food composition and six reports mentioned the need for better methods for measuring food composition and better updating and access to food composition data. Yet only about \$5.3 million, or 15 percent of the total research funds, were available for this food-related research. The FY 1978 level of support is insufficient to carry out the program being recommended by the non-Federal research review groups. Additional support is needed to improve methodology in this research category.

Eight of the research review groups suggested that the effects of nutrition on both physical and mental development should be studied. This type of research was included in the HNC definition of human nutrition research. However, it received a very small part, \$0.5 million, of the total research funds. This low level of funding, about 60 percent of which was from non-USDA sources, reflects the inadequacy of existing funding to support basic laboratory research in human nutrition and the danger of spreading available monies over too many areas of work, rather than the consideration of its importance.

Eight of the reviews stressed the need to evaluate information and education programs, whereas five mentioned evaluation of nutrition effects of government food programs and policies. A sizeable research effort, involving about \$6 million, is underway to evaluate these programs. Over \$4 million of the funds are from FNS. The evaluation projects were so recently initiated that it is premature at this time to draw conclusions as to the adequacy of the extent of the undertaking.

The 1977 Food and Agriculture Act, Section 1428, directed the Secretaries of USDA and DHEW to submit a proposal for a comprehensive nutritional status monitoring system. In FY 1980, Congress made available an estimated \$1 million additional funds to HNC for research on nutritional and dietary status monitoring, the work to be conducted in USDA's Human Nutrition Laboratory in San Francisco, California. The major initial emphasis will be on methodology for assessing status. The need for improved techniques for assessing nutritional status was mentioned in 8 of the 12 reports reviewed in section I.C.1. and 7 of the reports gave a priority to improved techniques for measuring food intake.

One evaluation factor in any overview of the Department's research programs is the distribution of funds among the intramural programs and that of cooperators. T. W. Edminster, Administrator of the Agricultural Research Service (now SEA-AR), in a November 12, 1976, memorandum to Honorable George McGovern, Chairman, Select Committee on Nutrition and Human Needs (Appendix D to Dietary Goals for the United States) wrote "National program managers recommend that...about 70 percent be used to finance

research performed by Land-Grant Colleges and other qualified public and private institutions." In FY 1978, about 25 percent of total SEA funds for human nutrition research was spent at extramural land-grant and other institutions. This percentage includes the Competitive Research Grants Program (CRGO) in the extramural estimate. Since then the HNC has received about \$5 million in additional funds for intramural research while extramural programs have been reduced because of a decrease of \$2 million in CRGO funds. The situation could be remedied by increased funding designated for human nutrition research and an increased commitment from formula funds. Mr. Edminster's memorandum made a strong case for greater support of extramural programs. The extramural locations--including both land-grant and non land-grant universities and colleges--provide people with specialized skills, facilities, and knowledge as well as providing the training ground for scientists to staff present and future programs.

It is important in considering the adequacy of nutrition research programs to look at them in the perspective of the Department's food and nutrition programs which are undergirded by the research. Food distribution and food stamp programs amounting to several billion dollars are administered annually by the USDA. Currently, nutrition education programs, carried out by the USDA and cooperators, are funded at about \$130 million. Nutrition research funding is about one-third of the nutrition education funding or approximately \$40-\$45 million in FY 1980. Of the research funds, about one-half are used for research on applied nutrition problems and evaluation of food intervention programs. This work is expected to yield benefits over a short term and allow better use to be made of existing nutrition knowledge.

The other half of the research funds goes to obtain new knowledge of nutritional needs and the nutrient content of foods. These programs, providing mainly long-term benefits, are the source of the information needed to avoid and solve diet related problems in the future. The solution does not rest in shifting current research dollars between long-term basic research and applied research that will provide immediate benefits. The answer is rather to increase total funding for nutrition research to a level sufficient to support a program of the size and quality to supply the knowledge needed to administer effective food and nutrition programs of the size and diversity undertaken in USDA.

2. Extension

Data obtained from State Extension directors indicate extensive effort in the areas of basic nutrition education and food selection and preparation. It is estimated that 1,300 professional staff years are devoted to these categories. Food preservation and food safety represent another major program area, involving 350 professional staff years. A high priority for future emphasis is placed on diet and health (table 11).

Although the major method used by paraprofessional extension staff is individualized education, professionals use a variety of methods with the majority of staff years expended utilizing group instruction. It is significant that a high priority for future emphasis was given to mass media utilization. Many staff members recognize the need to reach larger numbers of people than conventional program methods allow. Almost no one thinks that

individual counseling should receive greater attention in the future. The clientele group receiving major emphasis by paraprofessionals is the homemaker with young children. The professional staff currently spends proportionately more time with other age groups although priorities to concentrate on young families and teenagers were identified. The category "other adults" was not selected for future growth. Low-income families in urban areas, particularly minorities, have been identified as clientele who should receive additional time in the future. Relatively few Extension administrators suggest that increased time be spent with rural white families. It is important to remember, however, that respondents were asked to identify which areas should be increased, given a constant level of funding. If additional funding were available, it is likely that other clientele groups would receive increased attention.

Extension nutrition staff represent a major manpower resource. It is estimated that over 5,300 full-time equivalent staff (FTE), State and county level, are teaching nutrition...on the average over 100 FTE staff per State. Of these staff, 1,654 FTE per State are professionals holding bachelor or advanced degrees. Current information indicates that the percentage of county home economists holding advanced degrees is about 25 percent. It is a practice in many States to require that open positions be filled with staff who either hold M.S. degrees or are eligible to enter a graduate program. New staff are more apt to have advanced degrees. It is essential to continue to provide the scientific backup for these individuals so that

they may reach the public with the most current, accurate nutrition information. In addition, nutrition education research should identify appropriate methodology so that Extension staff may reach more people and increase their impact on their clientele.

In addition to the priorities identified by State Extension staff (table 11), Congress has specified areas of emphasis. The Food and Agriculture Act of 1977 contains several such references.

Title XIII, Section 11f, states that "To encourage the purchase of nutritious foods, the Secretary shall extend the expanded food and nutrition education program to the greatest extent possible to reach food stamp participants."

Title XIV, Section 1425, states that "In order to enable low-income individuals and families to engage in nutritionally sound food purchasing and preparation practices, the expanded food and nutrition education program presently conducted under Section 3(d) of the Act of May 8, 1914 (38 Stat. 373, as amended; 7 U.S.C. 343(d)), shall be expanded to provide for the employment and training of professional and paraprofessional aides to engage in direct nutrition education of low-income families and in other appropriate nutrition education programs."

The identification of low-income families, particularly recipients of USDA food assistance programs, as a high-priority audience is clearly stated.

The Food and Agriculture Act of 1977 also indicates that nutrition education programs for clientele in income ranges above poverty guideline levels are not precluded. In fact, a high-priority information area is the results of food and human nutrition research performed or funded by the Department of Agriculture (section 1425).

A reference in the Food and Agriculture Act of 1977 is made to development of a national food and human nutrition research and extension program which includes the development of techniques and equipment to assist consumers in the home or in institutions in selecting food that supplies a nutritionally adequate diet (sec. 1422). New initiatives are requested of the Federal government and cooperators in the area of research and extension in human nutrition and food consumption patterns in order to improve the health and vitality of the people of the United States (sections 1402, 1403). These mandates, as well as an admonition in Section 1402 that useful research results are not currently being efficiently transferred, appear to emphasize the need to work to recognize and strengthen the Extension contribution to the human nutrition programs in USDA and the States.

3. Higher Education

The Food and Agriculture Act of 1977, Section 1417, authorizes grants administered by the Secretary of Agriculture "to strengthen programs of training and research in the food and agricultural sciences for scientists at the graduate and postdoctoral levels at all colleges and universities," and grants "to strengthen undergraduate programs in the food and agricultural

sciences at all colleges and universities." Further, it states that the Secretary "shall conduct a program of predoctoral and postdoctoral fellowships in the food and agricultural sciences." None of these programs has been funded to date. Currently, the Department of Agriculture has no program for specifically supporting the training of nutrition scientists.

The review of recent reports, contained in section I of this report, suggested the need for training of additional nutrition scientists and educators to meet the demands created by increased funding of human nutrition research and education programs. From the data available, it was not possible to determine specifically the number and size of human nutrition programs within colleges and universities. However, the figures presented on graduate programs suggest that these programs are few in number and do not enroll large numbers of students (in contrast to undergraduate nutrition programs which are somewhat more numerous and which typically enroll significantly larger numbers of students).

The language of the Food and Agriculture Act of 1977 suggests that training of students and strong research programs go hand in hand. It has been suggested by some who have examined the situation, that a major limitation in training well-qualified nutritionists lies in the limited ability of colleges and universities to maintain on a continuing basis high quality nutrition research programs of appropriate depth and breadth. If this is true, then long-term funding of research at significant levels will be necessary to improve the output of well-qualified nutrition scientists and educators. It seems reasonable that a program for this purpose should be available to a variety of highly qualified institutions and should capitalize

on already existing areas of relative strength in research capacity. Currently, no long-term Federal funding for this purpose exists (5). Funding for existing higher education programs comes from State sources and from the grant funds obtained by individual faculty members. There is a need for appropriation of Federal funds to carry out the directive of the 1977 Food and Agriculture Act. As indicated in the inventory, DHEW provides some funds to students for graduate and postdoctoral training in nutrition.

Data necessary to assess precisely the manpower resources needed in the area of human nutrition are limited, and it is difficult to assess the numbers of people currently being trained. Some further assessment of number and size of graduate programs in nutrition would be useful in guiding plans for funding in higher education.

4. Other Nutrition Education and Information Programs

Most of the USDA money currently going into nutrition education programs is in programs for special audiences. The NET program, the WIC program, and the EFNEP program are all examples of this type of program (section II.D.). Funds for both NET and EFNEP are distributed to States on the basis of a formula designed by Congress. Funding for the education component of the WIC program is based on a percentage of the total dollars available.

The 1977 Food and Agriculture Act, Section 1425, says that the present EFNEP program "shall be expanded to provide for the employment and training of professional and paraprofessional aides to engage in direct nutrition education of low-income families and in other appropriate nutrition education programs." The current level of funding in this program has not kept pace with inflation, retaining a fairly constant number of dollars in recent years. Results from the current evaluations of Extension programs, as well as the current inventory and evaluation of NET programs, will be helpful in assisting the Joint Council to set priorities in the area of education programs directed to narrowly specified groups.

The Department has two general programs of nutrition education and information, in addition to the programs for special audiences and the general program carried out by the Cooperative Extension Service (section C.2.).

The 1977 Food and Agriculture Act, Section 1411, established, within the National Agricultural Library, a Food and Nutrition Information and Education Resources Center. It made the center responsible for assembling and collecting food and nutrition education materials, including the results of nutrition research, training methods and procedures, the maintenance of these materials in a library, and the dissemination of this information and materials on a regular basis to State educational agencies and other interested persons. The FY 1979 budget for this program was set at \$475,000. It is expected that there will be some expansion of resources in FY 1980. The center has built a sizeable collection of print and audiovisual materials, has catalogued these materials, and makes them available upon request. The

center is also building a data base, and abstracting materials from 1970-79, for online retrieval of nutrition information upon request. Currently, plans are being made for ways to aid professional and nonprofessional users to obtain, on a regular basis, recent nutrition information.

The 1977 Food and Agriculture Act, Section 1425, charged the Secretary of Agriculture with establishing "a national education program which shall include, but not be limited to, the dissemination of the results of food and human nutrition research performed or funded by the Department of Agriculture." Research results are conveyed to scientists and certain other professional users through publication in scientific journals. The cost of this publication is incorporated into nutrition research budgets and has not been estimated separately.

The HNC, in collaboration with the Office of Governmental and Public Affairs (GPA) and SEA Information, also has an active program of information media development for the general public, and for technical and semitechnical audiences. These materials are used by SEA Extension, FNS, and other groups responsible for nutrition education. The quality of these publications has been criticized in the past, but a recent publication, FOOD, has been well received by critics and the public. Policy guidelines as to objectives of agency publication programs and the numbers and types of media desirable for various audiences are under discussion. Decisions as to allowable cost, target audiences, and amount of effort through print and nonprint media will be critical in determining the overall quality and effectiveness of this program. These uncertainties make discussion of program gaps somewhat

difficult. Certainly, it is clear that the program must provide more effective dietary guidance materials than in the past. New dietary guidelines soon to be issued by the Federal government will require a focused information effort to reach the general public and professionals who educate or inform the public about these matters.

5. Overall Program

For the purposes of this report, separate inventories were conducted human nutrition research, extension, higher education, and consumer education and information programs. In the preceding sections, each area was examined separately to discover limitations or gaps in program. The overall program was examined to see the relationship that exists between the various components.

The research inventory contained herein was for FY 1978, whereas, most of the other information provided was for FY 1979. The research budget increased by about \$5 million between FY 1978 and FY 1979, but the changes in distribution of the program were minor and for the purposes of overview, all the inventories may be considered together. First, the proportion of funds in the food and agricultural sciences going into work in nutrition was considered. In the Food and Nutrition Service of the USDA, a small proportion of funds going into food programs is used for nutrition research and education. In FY 1979, \$18 million was spent on nutrition education in the WIC program; \$26 million was spent on the Nutrition Education and Training program. Relatively smaller amounts were used for education associated with the Food

Stamp program (less than \$3 million), and much smaller amounts (less than \$0.5 million) were associated with food labeling programs. The nutrition education programs in the Food and Nutrition Service are targeted to special audiences and are funded at about \$50 million per year.

Within the Science and Education Administration, there is also a nutrition education program (the Expanded Food and Nutrition Education Program, EFNEP) which is targeted to a special audience, low-income families with children. This program is currently funded at about the level of \$50 million per year. The general food and nutrition education program carried out by SEA-Extension involves about \$9-\$10 million per year in USDA funds and another \$20-\$25 million per year (see the inventory for more precise figures) in funds from State, local, and other sources for a total of around \$30-\$35 million.

Current estimates indicate that the Human Nutrition Center is spending about \$0.5 million on its dietary guidance and nutrition information program and that GPA spends something over \$1.0 million on its program, principally for reprinting publications developed by USDA agencies. The Food and Nutrition Information Center of the National Agricultural Library spends about \$0.5 million per year. Thus, general information programs in USDA are about \$2.0 million per year. The food and nutrition education and information programs of USDA, in the aggregate, are budgeted at around \$130-\$140 million annually. About \$100 million of this is support for programs for special audiences, and the remainder is for general education, dietary guidance, and information services. It may be useful to further examine the numbers and types of audiences reached by these programs and to identify segments of the

general public currently not being reached effectively. The results of current evaluation studies of EFNEP, NET, and other programs will aid decision makers in reviewing the balance and effectiveness of their current education programs. The discrete information programs of various USDA program units and agencies also should be reviewed comprehensively.

An examination of the nutrition research component of USDA-State programs in the FY 1978 inventory indicated that about \$35-\$40 million was spent from all sources. Slight increases in funding of USDA research programs, plus the addition of the Competitive Research Grants program in FY 1979, brought the FY 1979 funding to about \$45-\$50 million. Thus, research in the USDA-State programs is funded to about 35 percent of the level of funding for nutrition education. No Federal funds are expended in higher education directly in support of nutrition training; thus, the total USDA-States nutrition program is about two-thirds education and one-third research. (This ignores the State funds used in support of training in nutrition--see section II.C.)

The proportion of Federal funds in the food and agricultural sciences being spent on nutrition programs is of interest. In FY 1979, the total Science and Education Administration budget was about \$800 million. About \$90 million of this, or 11 percent, was designated for nutrition. Of the \$90 million, \$50 million was directed to the EFNEP program; if these dedicated funds are excluded from the analysis, then funds for nutrition represent \$40 million out of \$750 million, or 5-6 percent of the SEA budget. Of SEA funds allocated to food and agriculture research, about 6 percent go to

support human nutrition research. Of the approximately \$110 million in Hatch Act funds, about 3 percent go to support nutrition research; 16 percent of PL 89-106 funds to the 1890 colleges and universities and Tuskegee Institute were used for support of human nutrition research. About 5 percent of the Smith-Lever funding for the general Extension program is designated for human nutrition.

The total funding in the nutrition research and education program carried out by USDA and cooperators is remarkably small in comparison with the several billion dollars going each year into food assistance programs within the Department. These food assistance programs are of high priority and have been shown to improve the health and nutritional status of their participants. In order to maintain and increase the future effectiveness and efficiency of these programs, it will be necessary to further increase the Department's commitment to and investment in human nutrition research and education.

IV. IDENTIFICATION OF COORDINATION NEEDS

A. Summary of Findings

The need for coordination of human nutrition activities has received considerable attention in the reports reviewed. This is not surprising considering the complexity, scope, and dispersion of human nutrition efforts. Funding source multiplicity, competitive legislative processes, and the complex diversity of organizations, objectives, and programs that they support, all suggest the need for improved coordination. Also, the social and political demand for more efficient and effective use of national resources requires that all federally funded activities be reviewed and, if needed, improved. Nutrition, like all national agenda items, is an area that is in need of coordination and would benefit from these strategies.

Coordination is used to signify many different processes in the reports. Better coordination in some instances means better or more comprehensive and appropriate data for planning at the national level. At other times, coordination implies improved organization and management of the system or cooperative planning and priority setting. Again, this means consistency in program implementation approaches. Other interpretations of coordination, as used in the reports, include facilitation and technical assistance from the viewpoint of policy guidance, and the development of processes that permit evaluation of progress, operations, and outcomes. A primary base for this discussion was the progress report of the Priorities and Strategies Committee of the Joint Council on Food and Agricultural Sciences--January 9, 1979.

Criticisms of the present system emphasize problems of fragmentation and lack of concentration of efforts; lack of appropriate dialogue among those involved in the research, extension and higher education sectors; inadequate means for national policy and planning to be accomplished; and insufficient data needed for planning, management, and evaluation of the system.

How coordination should be accomplished is given only scant attention in the reports. There is some recognition that channels, mechanisms, and authority for national coordination require the designation of a responsible entity to facilitate and guide the coordination process. However, establishment of formal means of coordination does not assure its accomplishment. Coordination implies accord among participants, mutual trust, mutual recognition that there are common benefits to be gained, and sensitivity to differing needs. Formal processes of coordination are time consuming and actually may result in less efficient procedures than expected. It should be recognized that coordination among individuals within common areas of activity such as research often works better than coordination among organizations protective of their organizational roles and domains. A means of improving coordination, then, may be proximity and a reward system that reinforces the value of coordination, rather than the development of organizational structures. Any effort directed at improvement of coordination in human nutrition should be reviewed by all parties who are participants or who represent intended beneficiaries to insure that it is the process that has been improved, not the structure.

B. Recommendations

The recommendations presented here by the Ad Hoc Committee on Human Nutrition of the Joint Council on Food and Agriculture represent issues that we feel are clear and conclusive in the reports and inventories reviewed. In our opinion, they are issues that deserve the attention of the Joint Council and, if acted upon, would be likely to improve the efficiency and effectiveness of human nutrition programs.

1. Provide for a data base for planning coordinated nutrition programs--It is recommended that the Joint Council through its coordinating mechanism pay particular attention to development of a comprehensive data gathering, storage and retrieval system which will include information on all nutrition research, education and information programs carried out by but not limited to the USDA and its cooperators for use in planning coordinated nutrition programs.
2. Assure adequate attention to human nutrition programs in long-term planning--It is recommended that the Joint Council in their national-regional planning efforts focus particular attention on the long-range needs for human nutrition research, extension, and education programs.
3. Strengthen university capacity for research and training in human nutrition--It is recommended that the Joint Council request the Secretary to provide funds for long-term support to strengthen the capacity of colleges and universities for research and training in human nutrition. Such funding, to strengthen university research programs, is essential for providing adequate numbers of well-trained nutrition scientists and nutrition educators.

4. Establish policy on dissemination of new nutrition knowledge--It is recommended that the Joint Council request the Secretary to establish a clear policy to (1) define the scope and nature of the Department's commitment and investment to encouraging better nutritional practices among the public consistent with new nutrition knowledge and (2) identify adequate organizational and budgetary resources to implement this policy.
5. Establish a focus for coordination of USDA nutrition information and education programs--It is recommended that the Joint Council request the Human Nutrition Center to take lead responsibility for developing, in cooperation with SEA-Extension and FNS, a coordinated approach for refocusing the nutrition information and education programs of the Department, taking into account the newly developed dietary guidelines and public need and demand for this guidance. This should include strategies for making the public aware of the new Federal guidelines, and for the development of high quality media materials for use by educators, program leaders, and the general public, and for expanding public access to and use of the information.

6. Assess higher education programs in human nutrition--It is recommended that the Joint Council request the Director of SEA to further support scientific ventures directed toward the clarification and analysis of nutrition research and instruction programs within the realm of higher education. This would involve supporting the expressed intent of the National Academy of Sciences Board of Agriculture and Renewable Resources to conduct a joint project with SEA, focusing on both a qualitative and quantitative analysis of human nutrition programs in higher education and on improvement of the quality of training.
7. Review balance between intramural and extramural funding of human nutrition research--The Joint Council is requested in its consideration of future funding for human nutrition research to give attention to the balance between funding of intramural and extramural programs, including land-grant universities and colleges. The undertaking should include some attempt to measure research productivity in quality, quantity, and relativity to the Department mission. It is recommended that the Joint Council advise the Secretary of the need for increased support of extramural nutrition research to maintain an effective balance between intramural and extramural activities.

STATUTORY AUTHORITIES for

USDA FOOD AND NUTRITION ACTIVITIES

ATTACHMENT 1-1

Program	Statutory Citation	Description
RESEARCH		
Leadership in agricultural research, extension, and teaching programs in the food and agricultural sciences.	National Agricultural Research, Extension, and Teaching Policy Act of 1977, Section 1405, 7 U.S.C. 3121.	Department of Agriculture designated as lead agency of the Federal Government for agricultural research, extension, and teaching in the food and agricultural sciences. By definition this includes food and human nutrition.
Cooperative agricultural research.	Hatch Act, 7 U.S.C. 361a-361i.	Provide grants to States to conduct agricultural research in its broadest aspects. Such research includes nutrition research.
Research facilities grants	Act of 7-22-1963 7 U.S.C. 390-390j.	Grants to departments of colleges established to conduct agricultural research to assist such institutions in the construction, acquisition or remodeling of facilities for the conduct of research in agriculture and related sciences (including food and nutrition research).
Research on domestic animals and poultry.	Act of 5-29-1884, 7 U.S.C. 391.	Conduct research on domestic animals and poultry, their protection and use. Such research includes nutritional value of animals and poultry.
Dairy research.	Act of 5-29-1924, 7 U.S.C. 402	Conduct research relating to the dairy industry. Such research includes nutritional value of dairy products.
Human Nutrition Research.	Act of 6-29-1935, Section 1, 7 U.S.C. 427	Conduct research into the basic problems of agriculture in its broadest aspects, including research on human nutritional requirements and composition and nutritive value of food.

Program	Statutory Citation	Description
National food & human nutrition research & extension program	National Agricultural: Research, Extension, & Teaching Policy Act of 1977, Sections 1421-1425, 7 U.S.C. 3171-3175.	Conduct research on various aspects of human nutrition, carry out a national education program to disseminate results of food and human nutrition research performed or funded by the Department, and disseminate educational materials on food and nutrition education.
Nutritional monitoring of the population. (Sec. 1428 also)	Act of 6-29-1935, 7 U.S.C. 427.	Conduct surveys of food consumption patterns of Americans, including their dietary habits. This nutrition information is used by the Department in various programs.
Nutrition Status Monitoring.	National Agricultural: Research, Extension, & Teaching Policy Act of 1977, Sec. 1428, 7 U.S.C. 3178.	Secretary of Agriculture together with Secretary of Health, Education & Welfare are to develop a nutritional status monitoring system to identify the extent and risk of nutrition related health problems in the United States. The efficacy of nutrition-related programs in reducing health risks must also be evaluated.
Standards and utilization research.	Agricultural: Marketing Act of 1946, Sec. 203, 7 U.S.C. 1622.	Conduct and foster research to improve standards of quality of agricultural products and conduct consumer education to more effectively utilize agricultural products. Such research would include nutritional value of food.
Nutrition Research in foreign nations.	Agricultural: Trade Devel. & Assistance Act of 1954, Sec. 104, 7 U.S.C. 1704(b)(3).	Use or enter into agreement with foreign countries to use foreign currencies accruing to the United States pursuant to sales of agricultural commodities for the purpose of conducting research and promoting and supporting programs overseas relating to health and nutrition.

Program	: Statutory : : Citation :	Description
Research in tropical and subtropical agriculture.	: Agricultural: : : Trade : : Development : : & Assistance: : : Act of 1954,: : Sec. 406, : : 7 U.S.C. : : 1736. :	Conduct research to improve tropical and subtropical food products. Such research would include the nutritional value of such food products.
Cooperative agricultural research at 1890 land-grant colleges.	: National : : Agricultural: : : Research, : : Extension, : : & Teaching : : Policy Act : : of 1977, : : Sec. 1445, : : 7 U.S.C. : : 3222. :	Provide grants to 1890 colleges to conduct agricultural research in its broadest aspects. By definition this includes nutrition research.
National Agricultural Research Awards.	: National : : Agricultural: : : Research, : : Extension, : : & Teaching : : Policy Act : : of 1977, : : Sec. 1418, : : 7 U.S.C. : : 3153. :	Make awards in recognition of outstanding contributions to the advancement of the food and agricultural sciences. By definition this includes human nutrition.
Improvement of poultry.	: Act of : : 9-21-1944, : : 7 U.S.C. 429: :	Cooperate with States to improve poultry and poultry products. Nutritional value of poultry would be included in program.
Research Grants.	: Act of : : 8-4-1965, : : Sec. 2, : : 7 U.S.C. : : 450i. : : 91 Stat. 991: : : Sec. 1414. : : :	Administer a program of competitive grants for research to further the programs of the Department of Agriculture and a program of special and facilities grants to promote research in the food and agriculture sciences. By definition this includes food and human nutrition research.

Program	Statutory Citation	Description
Wheat and wheat foods research & nutrition education (in the planning stage).	Wheat and Wheat Foods Research and Nutrition Education Act, 7 U.S.C. 3401 et seq. of the Food & Agri- culture Act of 1977.	Issuance of an order providing for an industry financed and administered program, under the supervision of the Secretary, to improve wheat quality and educate consumers as to the nutritional value and economic use of wheat products.
EDUCATION		
Food Stamp Outreach	91 Stat. 970: par. (e)(1) (e)(1)(a). 91 Stat. 972: subpara. 15 7 U.S.C. 2020 (e)(15):	Develop posters and pamphlets for Food Stamp recipients which (1) list highly nutritious foods, (2) contain menus combining such foods, (3) describe other USDA nutrition programs, and (4) inform re: diet/health relationships.
Cooperative agricultural extension.	Smith-Lever Act, 7 U.S.C. 341-349.	Cooperate with States to provide instruction in agriculture and home economics. Such instructions includes nutrition education.
Expanded food and nutrition education programs.	Smith-Lever Act, Sec. 3(d) 7 U.S.C. 343(d); Agriculture Appropriat- ion Act, 1978, 91 Stat. 814; National Agricultural Research,	Cooperate with states to provide food and nutrition education programs to the nation's poor and depressed families.

Program	: Statutory : : Citation :	Description
	: Extension & : : Teaching : : policy Act : : of 1977, : : Sec. 1425(b): : 7 U.S.C. : : 3175(b). : : (91 Stat. : : 1000 Sec. : : 1425(a)(b). :	
Urban gardening.	: Smith-Lever : : Act, : : Sec. 3(d) : : 7 U.S.C. : : 343(d); : : Agriculture : : Appropriat- : : ion Act, : : 1978, 91 : : Stat. 814. :	: Cooperate with States to assist low income : : families to grow fresh vegetables and to : : learn more about nutritional diets. :
Food and Nutrition Information and Education Resources Center.	: National : : Agricultural: : : Research, : : Extension, : : & Teaching : : Policy Act : : of 1977, : : Sec. 1411, : : 7 U.S.C. : : 3126 (b). : : (91 Stat. : : 990 Sec. : : 1411(b). :	: Assemble, maintain and disseminate food : : and nutrition education material : : including the results of nutrition : : research. :
Grants and fellowships for food and agricultural sciences education.	: National : : Agricultural: : : Research, : : Extension, : : & Teaching : : Policy Act : : of 1977, : : Sec. 1417, : : 7 U.S.C. : : 3152. :	: Grants to colleges to strengthen : : programs of training and research in the : : food and agricultural sciences at the : : undergraduate, graduate, and post : : doctoral level; and predoctoral : : and post doctoral fellowships in the : : food and agricultural sciences. By : : definition these sciences include human : : nutrition. :

Program	Statutory Citation	Description
	91 Stat. 996: Sec. 1417. 91 Stat. (Grants to individuals) 997 Sec. 7 U.S.C. 3153.	
Nutrition Education Materials.	National Agricultural: Research, Extension, & Teaching Policy Act of 1977, Sec. 1426, 7 U.S.C. 3176. (91 Stat. 100 Sec. 1426).	Directs the Secretary of Agriculture to consult with the Secretary of Health, Education, and Welfare and to develop and distribute to State departments of education a comprehensive set of food and nutrition education materials.
Nutrition Education in WIC.	Sec. 17(d) of CNA of 1966 as amended by 42 U.S.C. 1786(d). Sec. 6(a)(3) of NSLA (42 U.S.C. 1755(a)(3).	Nutrition training and education for food service personnel.
Nutrition Education in Schools.	Sec. 18 of CNA of 1966 as amended (42 U.S.C. 1787(b).	Research and development project relevant to teaching school children the nutritional value of foods, etc.
Nutrition Education and Training.	Sec. 15 of the National: School Lunch: Act and Child Nutrition Amendments of 1977, 42 U.S.C. 1788.	Establishes an entitlement program of grants to States for nutrition education projects.

Program	Statutory Citation	Description
Cooperative agricultural extension at 1890 land-grant colleges.	National Agricultural Research, Extension, & Teaching Policy Act of 1977, Sec. 1444, 7 U.S.C. 3221.	Cooperate with 1890 colleges to provide instruction in agriculture and home economics. Such instruction includes nutrition education.
Nutrition education and training.	Child Nutrition Act of 1966, Sec. 19, 42 U.S.C. 1788.	Formula grants to States to provide for comprehensive nutrition education and training programs for school and child care institution personnel, and for the conduct of nutrition education activities, using the school lunch and other child nutrition programs as a learning laboratory.
FOOD GRADING AND INSPECTION		
Mandatory meat inspection.	Federal Meat Inspection Act, 21 U.S.C. 601-619.	Inspections of cattle, sheep, swine, goats, horses, mules, and other equines, and of carcasses and parts thereof, and of meats and meat food products thereof, and of the sanitary conditions of establishments in which such meat and meat food products are prepared in order to protect the health and welfare of consumers by assuring that meat and meat food products distributed to them are wholesome, not adulterated, and properly marked, labeled and packaged. The Secretary of Agriculture is authorized to promulgate requirements with respect to labeling and packaging and to promulgate standards for such meat and meat food products, including standards of nutrition.

Program	Statutory Citation	Description
Mandatory poultry products inspection.	Poultry Products Inspection Act, 21 U.S.C. 451-470.	Inspections of poultry and poultry products, and of the sanitary conditions of establishments in which such poultry and poultry products are prepared in order to protect the health and welfare of consumers by assuring that poultry products distributed to them are wholesome, not adulterated, and properly marked, labeled, and packaged. The Secretary of Agriculture is authorized to promulgate requirements with respect to labeling and packaging and to promulgate standards for such poultry products, including standards of nutrition.
Voluntary inspection, certification and special services relating to meat and other products	Agricultural Marketing Act of 1946, 7 U.S.C. 1622, 1624; Act of June 30, 1914, 21 U.S.C. 692; Act of May 28, 1908, 21 U.S.C. 693.	Inspection and certification by USDA employees regarding wholesomeness and identity of meat, meat food products, meat byproducts, poultry, and poultry products, not subject to mandatory Federal inspection; inspection and certification regarding wholesomeness of animal casings and domesticated reindeer, rabbits, migratory water fowl, game birds, and squab, and the products thereof, and dairy products for export; and certification as to whether certain meats, poultry, and meat and poultry products, and technical animal fat for export from the United States meet the standards and other requirements of the importing country.
Quality grading.	Agricultural Marketing Act of 1946, 7 U.S.C. 1621 <u>et seq.</u>	Promulgate uniform quality standards and provide grading services for various commodities including meats, fruits, vegetables, and dairy products, whereby consumers have a means of identifying the quality of foods.
Grain inspection.	United States Grain Standards Act, 7 U.S.C. 71 <u>et seq.</u>	Promulgate uniform quality standards and provide for inspection of grain enabling grain purchasers to identify the quality of grain. The Act further provides for research to improve inspection, grain quality, and evaluate the protein factor in establishing grain standards.

Program	: Statutory : Citation	Description
Egg products inspection.	: Egg Products: Provide inspections of eggs and egg : Inspection : products and of processing to assure : Act, : consumers of a wholesome and properly : 21 U.S.C. : packaged and labeled product. : 1031 <u>et seq.</u>	
FOOD ASSISTANCE PROGRAMS		
Food stamp program.	: Food stamp : Cooperative program with States under : Act of 1977, : which low-income households certified : 7 U.S.C. : by the States as eligible are given the : 2011-2027 : opportunity to obtain a more nutritious : (P.L. 95-113: diet by issuing them an allotment for : Title XIII). : coupons which may be used to purchase : : food from retail food stores approved : : for participation in the program.	
National school lunch program.	: National : Grants to States for disbursement to : School Lunch: schools and residential child care : Act, : institutions to enable them to buy : 42 U.S.C. : agricultural commodities and other : 1751 <u>et seq.</u> : foods and to prepare and serve such : : foods in nutritious lunches for : : children. Also, donation of agricultural : : commodities and other foods to States : : for use in such lunch programs.	
Summer food service program for children.	: National : Grants to States to enable them to : School Lunch: initiate, maintain, and expand, in : Act, : nonresidential child care institutions : Sec. 13, : and in summer camps, nonprofit food : 42 U.S.C. : service programs to serve nutritious meals : 1761. : during school vacation to children from : : areas in which poor economic conditions : : exist. Foods are also donated by the : : Department for use in such food service : : programs.	

Program	Statutory Citation	Description
Child care food program.	National School Lunch Act, Sec. 17, 42 U.S.C. 1766.	Grants to States to enable them to initiate, maintain and expand nonprofit food service programs to serve nutritious meals to children in nonresidential institutions which provide child care on a year round basis. Foods are also donated by the Department for use in such food service programs.
Special milk program.	Child Nutrition Act of 1966, Section 3, 42 U.S.C. 1772.	Grants to States to enable them to make payments to schools and child care institutions in connection with milk served to children, thus encouraging consumption of the agricultural commodity, fluid milk.
School breakfast program.	Child Nutrition Act of 1966, Section 4, 42 U.S.C. 1773, 1777.	Grants to States for disbursement to schools and residential child care institutions to enable them to buy agricultural commodities and other foods and to prepare and serve such foods in nutritious breakfasts for children. Also, agricultural commodities and other foods are donated for use in such breakfast programs.
Food service equipment assistance.	Child Nutrition Act of 1966, Section 5, 42 U.S.C. 1774.	Formula grants to States for disbursement to schools and residential child care institutions drawing attendance from areas in which poor economic conditions exist to enable such schools and institutions to acquire equipment for storage, preparation, transportation, and serving of food.
Supplemental food program.	Agriculture and Consumer Protection Act of 1973, Section 4, 7 U.S.C. 612c note.	Donations of special food packages to States for distribution through health facilities to persons in low-income groups vulnerable to malnutrition, i.e., infants and preschool children, and women during and 12 months after pregnancy.

Program	Statutory Citation	Description
Special supplemental food program.	Child Nutrition Act of 1966, Section 17, 42 U.S.C. 1786.	Grants to State health departments, Indian tribes, bands or groups, and the Indian Health Service of DHEW for disbursement to local health or welfare agencies to enable them to make especially nutritious foods available to pregnant or lactating women and to infants and children under five years of age who are at nutritional risk because of inadequate nutrition and inadequate income.
Food donation program.	Act of Aug. 24, '35; 7 U.S.C. 612c; Act of 6-28-1937, 15 U.S.C. 713c; Agricultural Act of 1949, 7 U.S.C. 1431; Agricultural Act of 1956, 7 U.S.C. 1859; Act of 9-6-1958, 7 U.S.C. 1431b; Act of 9-13-1960, 7 U.S.C. 1431 note; Food & Agricultural Act of 1965, 7 U.S.C. 144a-1; Older Americans Act of 1965, 42 U.S.C. 3045f; Agricultural & Consumer Protection Act of 1973,	Agricultural commodities are acquired (by direct purchase or through agricultural programs serving farmer's interests) and donated to child nutrition programs, needy Indian families, nonprofit summer camps for children, charitable institutions, projects for the elderly, penal and correctional institutions, supplemental food program, and disaster relief.

Program	: Statutory : : Citation : :	Description
	: 7 U.S.C. : : 612c note; : : National : : School Lunch: : Act, : : 42 U.S.C. : : 1755, 1762a.:	
Transfer of dairy products.	: Agricultural: : : Act of 1949, : : Sec. 202, : : 7 U.S.C. : : 144a. : : : : : :	Commodity Credit Corporation makes dairy products acquired under price support programs available to the Administrator of Veteran's Affairs for use in hospitals and to the Secretary of the Army for use by the Department of Defense, without charge except for packaging costs.
Miscellaneous food donation authorities.	: Agricultural: : : Act of 1954, : : 7 U.S.C. : : 1446c; Act : : of 8-19-1958: : : 7 U.S.C. : : 1431 note; : : Act of : : 9-21-1959 : : 7 U.S.C. : : 1431c; : : Mutual : : Security : : Act of 1954, : : 22 U.S.C. : : 1922. : : : :	These miscellaneous provisions mandate disposal of Commodity Credit Corporation dairy products under donation authorities, authorize Commodity Credit Corporation to purchase processed grain food products for domestic and foreign donation, require enrichment of cornmeal, corn grits, rice and flour and specified packaging in order to enhance and protect the nutritional value of donated foods, and require that foods be made available for domestic donation.
Financing purchase of agricultural commodities by foreign governments.	: Agricultural: : : Trade Devel.: : : & Assist. : : Act of 1954, : : 7 U.S.C. : : 1701-1715. : : : : : :	CCC finances on long-term credit the purchase of agricultural commodities by foreign governments. Priority must be given to countries which agree to use the proceeds from the sale of commodities in accordance with local development plans which are designed to increase access of poor to nutritious and stable food supply.

Program	Statutory Citation	Description
Food donations overseas.	Agricultural: Trade Devel. & Assist. Act of 1954, Title II, 7 U.S.C. 1721-1726.	The CCC makes agricultural commodities available to friendly governments, intergovernmental organizations, multilateral organizations and non-profit voluntary agencies, to meet famine or other extraordinary relief requirements; to combat malnutrition, especially in children; to promote economic and community development in friendly developing areas; and for needy persons and non-profit school lunch and preschool feeding programs outside the United States.
Food for development program.	Agricultural: Trade Devel. & Assist. Act of 1954, Sec. 301-307 7 U.S.C. 1727-1727f.	In order to encourage health and nutrition programs in countries receiving concessional financing for the purchase of agricultural commodities, the Secretary may permit the funds accruing from the local sale of commodities, used for such programs, to be applied against the repayment obligations of the recipient government.
PUBLIC PARTICIPATION		
Subcommittee on Food and Renewable Resources.	90 Stat. 471; 42 U.S.C. 6651(h).	A standing committee of the Federal Coordinating Council for Science, Engineering & Technology (FCCSET) created to review research and development programs, plan and coordinate and recommend policies relevant to domestic and world food and fiber production and distribution.
OTHER		
Farmer-to-consumer direct marketing.	Farmer-to-consumer Direct Marketing Act of 1976, 7 U.S.C. 3001-3006.	Promotion of the development and expansion of direct marketing of agricultural commodities (foods) from farmers to consumers through survey of direct marketing methods and provision of funds to states to carry out or encourage direct marketing methods. A purpose of the program is to enable consumers to obtain low-cost, nutritious foods.

1979 Appropriations and 1980 Executive Budget for
Human Nutrition Program within USDA 1/

HUMAN NUTRITION RESEARCH

(Dollars in thousands)

<u>Account</u>	<u>1978 Actual</u>	<u>1979 Appropriation</u>	<u>1980 Budget</u>
Science and Education Administration			
Human Nutrition Center/Agricultural Research	15,420	22,008	25,770
Cooperative Research	5,545	5,941	5,820
Competitive Grant Office	5,000	5,000	9,000
Total SEA	<u>25,965</u>	<u>32,949</u>	<u>40,590</u>
Economics, Statistics, and Cooperatives Service	989	1,033	1,593
Food and Nutrition Service	<u>1,686</u>	<u>5,787</u>	<u>4,187</u>
Total Research	28,640	39,769	46,370

FOOD AND NUTRITION SERVICE

(Nutrition Research)

(Dollars in thousands)

<u>Account</u>	<u>1978 Actual</u>	<u>1979 Appropriation</u>	<u>1980 Budget</u>
Food Program Administration	1,236	2,737	1,237
Food Stamp Program			
Research, evaluation, and demonstration projects (Section 17)	--	350	350
Special Supplemental Food Program for Women, Infants, and Children (WIC)			
Program evaluation	--	2,250	2,250
Child Nutrition Programs			
Nutritional Training and Surveys (Section 6)	<u>450</u>	<u>450</u>	<u>450</u>
Total, Food and Nutrition Service	1,686	5,787	4,187

1979 Appropriations and 1980 Executive Budget for
Human Nutrition Program within USDA 1/

HUMAN NUTRITION RESEARCH

SCIENCE AND EDUCATION ADMINISTRATION
Human Nutrition Center/Agricultural Research
(Dollars in thousands)

<u>Account</u>	<u>1978 Actual</u>	<u>1979* Appropriation</u>	<u>1980* Budget</u>
Food Composition and Improvement (National Research Program "NRP" 2090)	3,495	4,884	5,937
Human Requirements for Nutrition (NRP 2091)	6,776	9,690	13,246
Food Consumption and Use (NRP 2092)	<u>5,149</u>	<u>7,434</u>	<u>6,587</u>
TOTAL	15,420	22,008	25,770

Competitive Grants - Human Nutrition
(Dollars in thousands)

	<u>1978 Actual</u>	<u>1979* Appropriation</u>	<u>1980* Budget</u>
Nutrition Requirements	3,885	3,885	5,885
Food Choice	1,115	1,115	2,615
Food Composition	<u>-0-</u>	<u>-0-</u>	<u>500</u>
TOTAL	5,000	5,000	9,000

Cooperative Research - Human Nutrition
(Dollars in thousands)

<u>Account</u>	<u>1978 Actual</u>	<u>1979* Estimate</u>	<u>1980* Estimate</u>
Hatch Act:			
Nutrient requirements	1,054	1,054	1,054
Diet and nutritional status monitoring	700	700	700
Food preferences and eating habits	100	100	100
Food composition	1,000	1,000	1,000
Nutrition education research	<u>100</u>	<u>100</u>	<u>100</u>
TOTAL	2,954	2,954	2,954
1890 Institutions and Tuskegee Institute:			
Nutrient requirements	285	366	366
Diet and nutritional status monitoring	800	900	900
Food preferences and eating habits	700	700	700
Food composition	200	300	300
Nutrition education research	<u>500</u>	<u>600</u>	<u>600</u>
TOTAL	2,485	2,866	2,866
Federal Administration (direct appropriation):			
Nutrient requirements	<u>105</u>	<u>121</u>	<u>--</u>
TOTAL:			
Nutrient requirements	1,445	1,541	1,420
Diet and nutritional status monitoring	1,500	1,600	1,600
Food preferences and eating habits	800	800	800
Food composition	1,200	1,300	1,300
Nutrition education research	<u>600</u>	<u>700</u>	<u>700</u>
TOTAL	5,545	5,941	5,820

*Final project determinations and classifications have not been made.

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1979 Appropriations and 1980 Executive Budget for
Human Nutrition Program within USDA 1/

HUMAN NUTRITION EDUCATION

(Dollars in thousands)

<u>Account</u>	<u>1978 Actual</u>	<u>1979 Appropriation</u>	<u>1980 Budget</u>
Science and Education Administration			
Extension Home Economics	10,108	10,376	10,376
Adult EFNEP	40,460	41,460	40,460
4-H EFNEP	10,100	10,350	10,100
TIS	-0-	475	475
Total SEA	60,668	62,661	61,411
Food and Nutrition Service	38,900	47,205	46,723
Food Safety and Quality Service	448	448	448
Total Education	100,016	110,314	108,582

FOOD AND NUTRITION SERVICE

(Nutrition Education)

(Dollars in thousands)

<u>Account</u>	<u>1978 Actual</u>	<u>1979 Appropriation</u>	<u>1980 Budget</u>
Food Program Administration	1,620	1,339	1,356
Special Supplemental Food Program for Women, Infants, and Children (WIC)	9,880	18,233	24,900
Commodity Supplemental Food Program	200	433	467
Total, Special Supplemental Food Programs	10,080	18,666	25,367
Child Nutrition Programs			
Nutrition Education (Section 18)	1,000	1,000	-0-
Nutrition Education and Training (Section 19)	26,200	26,200	20,000
Total, Child Nutrition Programs	27,200	27,200	20,000
Total, Food and Nutrition Service	38,900	47,205	46,723

FOOD SAFETY AND QUALITY SERVICE

(Nutrition Education)

(Dollars in thousands)

	<u>1978 Actual</u>	<u>1979 Appropriation</u>	<u>1980 Budget</u>
How to buy and store food: Radio, TV, Brochures, etc.	348	348	348
Nutrition Labeling	100	100	100
TOTAL	448	448	448

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Memorandum and Questionnaire for Extension Service

COOPERATIVE EXTENSION PROGRAMS
UNIVERSITY OF WISCONSIN-EXTENSION

Madison, Wisconsin 63706

Area Code 608 262-9510

Office of Assistant Chancellor and
Director of Cooperative Extension

July 10, 1979

TO: State Extension Directors
Extension Administrators, 1890 Institutions and Tuskegee Institute

FROM: Gale L. VandeBerg, Chairman of ECOP

RE: Joint Council inventory of Extension work and needs in human
nutrition programs

The Joint Council on Food and Agricultural Sciences has identified human nutrition as one area the Council wishes to stress in its advice to the Secretary. On April 11-12, 1979 the Council passed a motion that an ad hoc council committee on human nutrition be appointed. This committee is to undertake (1) an inventory of existing work and objectives, (2) identification of gaps or additional work needed, and (3) specification of coordination needs. The members of the appointed committee are J. M. Iacono, D. H. Calloway and myself. Information provided by the federal CRIS system will be used for gathering research data. There is no comparable data available for Extension nutrition programs.

Jane Voichick and I have discussed alternative ways of getting Extension data with minimum effort and maximum validity. We decided not to sample or survey the counties in the various states. Instead, we believe that the State Leader of Home Economics, perhaps with assistance from a small group of staff such as a nutrition specialist, a 4-H home economist, an EFNEP coordinator, and district and/or program directors, can provide very adequate judgments. We have developed the enclosed questionnaire for this purpose. The questionnaire has been prepared to obtain information about (1) current levels of Extension effort in various areas of human nutrition, (2) judgments about how effort might be redistributed to meet pressing needs, and (3) assessments of which areas are in greatest need of additional resources. It may be helpful for the respondent(s) to first determine how many man years are being devoted to human nutrition by all Extension staff, other than administrators. That same total will appear in the total under each of the sections except the last one. Then the best possible judgments need to be made within each section.

In order for the committee to meet its deadline, we are asking that your state's response be returned to me no later than August 25, sooner if possible. I have been very, very pleased with your cooperation on many matters during this year. I am much aware of the numerous requests I and others are making this year, with the evaluation, budget and legislation. But I believe we are making progress. Thanks much.

Enclosure - questionnaire

xc: State Leaders of Home Economics

Nutrition Education Activities in Cooperative Extension Service

State _____

Respondent _____

Title _____

Instructions: Please respond to each item in terms of estimated man years expended in your state during this fiscal year, desirability of increasing or decreasing effort given similar funding, and highest priority for additional funding. Note that the totals for each of the various Sections should agree - each represents total state and county staff effort in the area of human nutrition excluding time for administration. Estimate of administrators time in this area is requested in Section VII. We realize that your answers will be "educated guesses". Please give us the best estimate available.

Section I - Content Areas	Current man years	Given same total man years use \oplus for area to increase, \ominus for area to decrease	Greatest need for additional funds. Check only 1 or 2 items/Section
1. Food buying and preparation Food composition, cost comparisons			
2. Diet and health (including obesity, heart disease, dental)			
3. Diet and motivation (effects of food advertising, peer pressure, use of ethnic, fast foods)			
4. Food preservation and food safety			
5. Other, if major identify it			
Total man years			

Section II - Time Spent Utilizing Specific Methods and Materials	Current man years	Given same total man years use (+) for area to increase, (-) for area to decrease	Greatest need for additional funds. Check only 1 or items/Section
1. Individual counseling and education			
2. Group education			
3. Mass media			
4. Development of material and teaching aids			
Total man years			

Section III* - Time Spent Teaching
Nutrition to Clientele
Groups

1. Families with young children			
2. Teenagers			
3. Older adults			
4. Other adults			
5. Commercial/Professional/other agency staff			
Total man years			

Section IV* - Time Spent Reaching Specific Ethnic Groups	Current man years	Given same <u>total</u> man years use \oplus for area to increase, \ominus for area to decrease	Greatest need for additional funds. Check only 1 or 2 items/Section
1. Black			
2. Hispanic			
3. Indians			
4. White			
5. Other			
Total man years			

Section V* - Time Spent Reaching Groups
with Specific Income Level

1. Families earning under \$10,000/year			
2. Families earning over \$10,000/year			
Total man years			

Section VI* - Time Spent Reaching People in Specific Type of Residence	Current man years	Given same <u>total</u> man years use \oplus for area to increase, \ominus for area to decrease	Greatest need for additional funds. Check only 1 or 2 items/Section
1. Farm and rural people in communities of less than 20,000			
2. People living in communities of more than 20,000			
Total man years		X	X
Section VII - Time Spent Administering Food & Nutrition Programs in Your State		X	X

